FLYSYNTHESIS

Catalina NG

User Manual

valid for versions with a Rotax 582 engine

Revision: 002
Date: 08/07/2011

THIS DOCUMENT MUST ALWAYS BE TRANSPORTED ON BOARD

General informations

I. Foreword

This User Manual it is provided with the ultralight aircraft Catalina NG and must be always held on board.
The pilot must be familiar with all normal and emergency procedures must take cognizance of the limitations mentioned in this User manual.
All these information are necessary to guarantee to operate in complete safety, in particular:

- **Pre-flight inspections**
- **Normal procedures**
- **Emergency procedures**
- **Limitations**
- **Performances**

The strict observance of these limitations and procedures is required for rider safety.
Flysynthesis srl is not responsible for damages or injuries suffered by partial or total failure to comply with the requirements contained in this User Manual

II. IDENTIFICATION DATA:

Manufacturer :	FLY SYNTHESIS SRL
Address :	Strada Provinciale n.78 Km 12.150 33050 Mortegliano (UD) ITALIA Tel. 0432-992482 – 993557 Fax 0432.931280 Web site: www.flysynthesis.com e-mail: technical.support@flysynthesis.com
Model :	FLY SYNTHESIS CATALINA NG
Version :	CATALINA NG
Engine model :	ROTAX 582 DCDI UL Mod.99
Serial number :	
Engine serial number :	
Propeller model :	
Propeller serial number :	
Registration:	
Date :	

III. Index

Introduction

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1. INTRODUCTION

This flight manual was created to provide suitable and clear information for pilots of FLY SYNTHESIS CATALINA NG aircraft, in order to guarantee an absolutely safe and efficient use. This manual applies only to the aircraft identified on page I in the configuration shown on the technical card on page 2-1. In addition to the normal page numbering, the manual has been divided into sections, chapter and paragraphs, which are summarised on the heading of each page, which makes searches easier. Each page also shows the revision number, as the manual, pages or individual sections may be fully or partially replaced in the future. Any updates must be printed and inserted in the manual as soon as possible to guarantee maximum safety when using the aircraft. The owner or the person using the aircraft must register the revisions in the following table: :

1.1 Revision registration

Rev. N.	Description	Date	Signature
000	First issue	02/08/2010	Cosatto C.
001	Complete revision	21/12/2010	Paulin C.
002	Some data update, added folding sysytem	08/07/2011	Paulin C.

As in this paragraph, the revised parts of the text will be marked by a black vertical line on the left side. If the manual has been fully revised the line will not be necessary.

This manual uses various «key» words defined below :

PRUDENCE

Procedures or instructions that, if not correctly observed, could cause an accident or death.

CAUTION

Procedures or instructions that, if not correctly observed, could damage aircraft parts.

NOTE

Procedures or instructions that require particular attention.

This manual must be complied with in order to use the aircraft. Furthermore, a copy of this manual must always be transported on board.

FLYSYNTHESIS S.r.l. declines all liability for any damage to people or property resulting from failure to observe or the partial observance of the instructions contained in this manual.

1.2 ENREGISTREMENT DES PAGES EFFECTIVE

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Technical Card

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2. Technical Card

2.1 Description

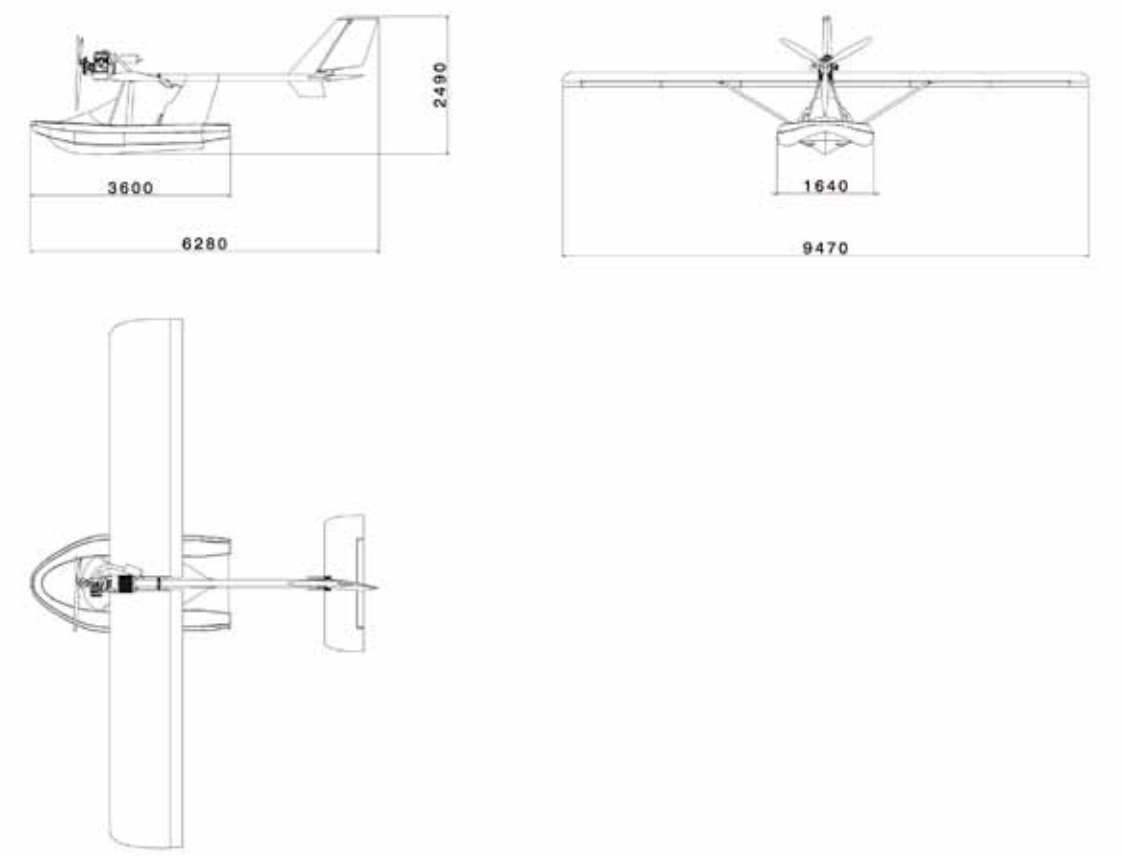
Catalina NG is a two seater ultralight amphibious aircraft with high counterwind wings and an open cabin. The fuselage, hull, wings and control surfaces are made out of composite material, whereas the tail boom is made out of aeronautic aluminium alloy. The rectangular plant type wing, with laminar profile, has Junker ailerons for the entire wingspan, used also as flaperons thanks to a suitable kinematic motion. The vertical tail surface consists of the fin (fixed) and the rudder (mobile), the horizontal surface consists of the flying tail, fully mobile plane, centrally hinged to the tail boom. The trim tab is integrated in the flying tail and also acts as an anti-servo tab. The fuselage mainly consists of the hull and the "tail beam pipe" that supports the outer wings, the empennage and the engine. The hull contains two seats, which are protected by a fairing with a windshield. The front tricycle type landing gear is retractable and is moved by hydraulic actuators. Once retracted, the wheels disappear inside the hull and the landing gear compartments are automatically covered by panels. The engine is positioned to the front on the fuselage beam and is powered by two tanks positioned symmetrically in the hull.

2.2 Dimensions

General :		
Wingspan:	9,470	m
Length:	6,280	m
Height:	2,490	m
Wings:		
Surface:	12,70	m2
Chord:	1,340	m
Wing loading:	37,20	kg/m2
Ailerons		
Surface (each):	0,96	m2
Span:	3,36	m
Chord:	0.25	m
Run (neutral position +6°):	+15° - 2°	
Flying tail		
Surface:	1.650	m2
Span:	2.450	m
Chord:	0.700	m
Run:	+17° - 12°	
Vertical fin		
Surface:	1.120	m2
Height:	1.280	m

Average run:	0.930	m
Rudder		
Surface:	0.600	m2
Height:	1.200	m
Average run:	0.480	m
Run:		+/-22°
Hull		
Length:	3.400	m
Width:	1.640	m

2.3 TRITTICO CATALINA NG :



2.4 WEIGHTS

Empty weight:	315 kg / 324 kg with parachutes	Kg
Maximum permitted baggage weight:	12	Kg
Maximum take-off weight:	495	Kg
Minimum pilot weight	55	Kg

2.5 ENGINE

Model:	Rotax 582 UL DCDI mod.99
Type:	two-cylinder, inline, two-stroke liquid cooled, aspirated dual ignition.
Displacement:	580.7 cc
Max. power:	48KW (64.4Hp SAE) at 6800 rpm
Max torque:	75Nm at 6000 rpm
Max rpm:	6800 rpm

For more information about the engine, consult the Rotax "Owner Operator Manual".

2.6 FUEL SYSTEM

2.6.1 TYPE :

Single line with an auxiliary mechanical and electric fuel pump positioned in series. Fuel draining system by means of a gascolator located on the right side of the hull, under the instruments panel.

2.6.2 TANKS :

Two removable tanks in the hull located symmetrically to the side of the pilots, with 25 litre capacity each. Fuel tanks with breather pipe.

2.6.3 UNUSABLE FUEL :

2 litres per tank.

2.6.4 FUEL FILTER :

Located inside the Gascolator.

2.7 PROPELLER :

Type :

Helix two-blade composite fixed propellere.

2.8 LANDING GEAR :

Type :

Hydraulic retractable front tricycle landing gear. Front steering wheel controlled by rudder pedals.

Track:		1.380 m
Pitch:		1.750 m
Tyres:	Rear:	5.00x6"
	Front:	4.00x6"
Tyre pressure:	Rear:	2.2 - 2.4 bar
	Front:	1.8 bar

Brakes: Hydroconic on the front wheel, controlled by a centrally positioned lever, 30 cm in front of the seats.

2.9 ELECTRIC SYSTEM :

Type: Electric 12 V DC system with a buffer battery / protected with fuses / rectifier - external governor

2.10 STANDARD INSTRUMENTS:

Anemometer, altimeter, rate of climb indicator, magnetic compass, turn coordination indicator, CHT, EGT, RPM, manual trim on the pitch axis, luminous landing gear position indicator.

RESTRICTIONS

3

3. Restrictions

Aircraft use must be compliant with the laws of the state in which it is used.
It is the task and responsibility of the commanding pilot to take this into account and respect the restrictions described in this section.

3.1 SPEED RESTRICTIONS

Speed			Notes
Vne	Never exceed speed	150 km/h	Never exceed this speed in any condition or configuration
Vmo	Maximum operating limit speed	130 km/h	Never exceed this speed in turbulent conditions
Va	Manoeuvring speed	130 km/h	The maximum speed at which the abrupt use of the complete run of the flight controls is permitted
Vfe	Maximum flap extended speed	105 km/h	Never exceed this speed with the flaps extended
Vs	Stall speed without flaps	65 km/h	Never go below this speed without flaps to avoid undesired stalling.
Vs0	Stall speed in landing configuration (flaps extended)	55 km/h	Never go below this speed with the flaps in the landing position to avoid undesired stalling.
Vlg	Permitted speed with the landing gear extended	120 km/h	Never exceed this speed with the landing gear extended.

3.2 MARQUAGE ANÉMOMÈTRE

Marking	Speed range (IAS)	Definition
White arc	[Vs0 – Vfe] 55 – 105 km/h	Speed range where the flaps can be extended
Green arc	[Vs – Vmo] 65 – 130 km/h	Speed range for normal operations
Yellow arc	[Vmo- Vne] 130 – 150 km/h	Manoeuvre the aircraft with great caution
Red line	[Vne] 150 km/h	Maximum permitted speed

3.3 ENGINE LIMITATIONS

(Refer to the Rotax operative manual)	
Engine manufacturer:	Rotax Bombardier
Engine model:	582 UL
Maximum take-off power:	64.4 HP
Maximum continuous power:	58 HP
Maximum take-off RPM:	6800 rpm
Maximum continuous RPM:	6500 rpm
Maximum cylinder head temperature:	150°C
Type of usable fuel:	min 95 RON unleaded
Type of usable oil:	see Rotax manuals

3.4 ENGINE INSTRUMENTS MARKING

Instrument	Red line Lower limit	Lower yellow arc Caution	Green arc Normal operations	Upper yellow arc Caution	Red line Upper limit
RPM indicator	nd	nd	2000 – 6500 rpm	6500 – 6800 rpm	6800 rpm
Fuel pressure	0,15 bar	nd	0,15 – 0,4 bar	nd	0,4 bar
Water temperature	65°	nd	65° – 75°C	75° – 80°C	80°C

3.5 WEIGHT RESTRICTIONS

Empty weight:	315 kg / 324 kg with parachutes
Maximum fuel weight:	38 Kg
Maximum weight in baggage compartment :	12 Kg
Maximum take-off weight:	495 kg / 495 kg with parachutes

PRUDENCE: never exceed the maximum take-off weight

3.6 LIMITATIONS OF THE CENTRE OF GRAVITY :

In order to obtain the best flight and operating performance in complete safety, the aircraft must be used in compliance with the loading and balancing schemes indicated on the following pages.

It is the task and responsibility of the pilot to take these load parameters and limits into account.

Before delivering any aircraft, the empty weight and the position of the centre of gravity are measured.

NOTE

The empty weight and the centre of gravity must always be measured after replacing, modifying, integrating, repairing or painting any vehicle component or installed accessory. The empty weight and the corresponding positioning of the Centre of Gravity must be reported, after each measurement, on the weight and centring report only by people authorised to carry out this measurement.

The position of the centre of gravity can refer to the mean geometric chord (M.A.C.).

Front limit:	32% M.A.C. corresponding to 428 mm
Rear limit:	37% M.A.C. corresponding to 496 mm

See section 7 for the weighing test methodology and conditions.

PRUDENCE

if the barycentre is located outside these limits, both aircraft manoeuvrability and stability are jeopardised, with serious risks to pilot safety. The aircraft may not fly!

3.7 MANOEUVRE RESTRICTIONS :

All acrobatic manoeuvres are prohibited, including intentional spins.
Only manoeuvres connected to normal flight conditions are permitted. Manoeuvres with a bank angle no greater than 60° and a pitch angle no greater than + -30° are permitted.
In any case, the maximum permitted load factor is + 4 - 2g.
Any type of voluntary stall is prohibited.
Night-time flights, flights in icy conditions, snow and rain are prohibited.

NOTE

during the flight with a single pilot on board, the seat belts of the passenger seat must be fastened and well tightened.

3.8 LOAD FACTOR RESTRICTIONS :

The load factor limits used for the structure calculation comply with LTF-UL standards and are :

Retracted flaperons	g	Extended flaperons	g
Maximum positive	4.0 (+)	Maximum positive	2.0 (+)
Maximum negative	2.0 (-)	Maximum negative	0.0 (+)

PRUDENCE

Exceeding the load factor overloads the aircraft, with risks of possible structure damage or yielding. Uncoordinated manoeuvres could cause the load factor to be exceeded even if performed at a speed within the permitted limits or within the manoeuvre speed.

PRUDENCE

Due to problems related to damaging the engine, all manoeuvres with a load factor lower than - 0.5 g, may not be performed for a period of time that exceeds 5 seconds (see Rotax manual).

3.9 CREW :

The minimum crew is a pilot, the maximum number of people on board is two.

3.10 PROHIBITED USES :

The aircraft may not be used in the following weather conditions :

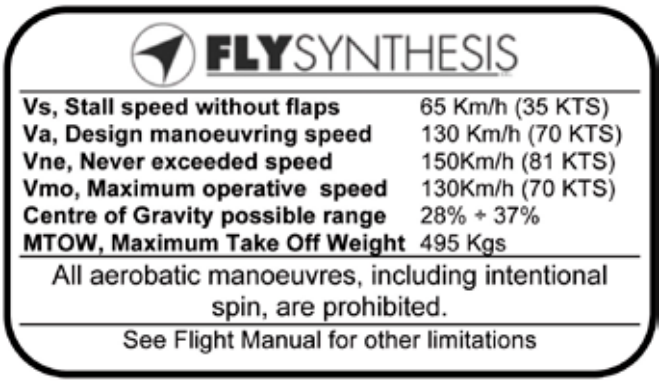
- Current rain
- Current hail
- Current snow
- Thick fog or haze
- Current storm
- Wind speed above 28 Km/h

It is prohibited to take off from or land on runways smaller than 250x30 metres (820x98 ft) and/or with obstacles at the end with an angle greater than 4°.

It is prohibited to take-off and land (on water) under conditions f-g-h in the following table :

Terms used by US Weather Service	Velocity (mph)	Estimating Velocities on land	Estimating Velocities on Sea	
A) Calm	less than 1	Smoke rises vertically	Sea like a mirror	Check your glassy water technique before water flying under these conditions
B) Light air	1-3	Smoke drilfts; wind varies unmoved	Ripples with the appearance of scales are formed but without foam crests	XX
C) Light breeze	4-7	Wind fell on face; leaves rustle; ordireary wind vane moves by wind	Smalt wavelets, still short but more pronounced; crests have a glossy appearance and do not breck	XX
D) Genfle Breeze	8-12	Leaves and small twigs in constant motion; wind extends light flag	Large wavelets: crests begin to break. Foam of glassy appearance. perhaps Scattered shitewaps	ideal water flying characteristics in protected water
E) Moderate Breeze	13-18	Dust and loose paper raised; small branches are moved	Small waves, becoming longer; fairly frequent whitecaps	XX
F) Fresh Breeze	19-24	Small trees in leaf begin to sway; crested wavelets form in inland water	Moderate waves; taking a more pronounced long form; many whitecaps are formed, chace of some spray	This is considered rough water for seaplanes and small amphibians, especially in open water
G) Strong Breeze	25-31	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty	Large waves begin to form; white foam crests are more extensive everywhere, probably some spray	XX
H) Moderate Gale	32- 38	Whole trees in motion; inconvenience felt in walking againstthe wind	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind	This type of water condition is for emergency only small aircraft in inland waters and for the expert pilot

3.11 RESTRICTION PLATES



OPERATIVE PROCEDURES

4

4. OPERATIVE PROCEDURES

4.1 NORMAL OPERATING SPEED

Unless otherwise indicated, the following speeds refer to the maximum take-off speed equal to 472.5 Kg and can be used for any lower weight. These speeds are approximate and can change if the aircraft configuration changes.

4.1.1 Take-off (Flap pos.1)

Rotation	70 Km/h (38 KTS)
Speed over a 50 ft obstacle (15 m)	80 Km/h (43 KTS)

4.1.2 Climb (Flaps retracted)

Best angle of climb speed (Vx)	78 Km/h (42 KTS)
Best rate of climb speed (Vy)	90 Km/h (48 KTS)
Best gliding speed (Ve)	80 Km/h (43 KTS)

4.1.3 Cruising

Cruising speed	120 Km/h (65 KTS)
Maximum speed in turbulent air (Vmo)	136 Km/h (73 KTS)
Never exceed speed (Vne)	150 Km/h (78 KTS)

4.1.4 Landing

Landing approach (Flaps lowered)	75 Km/h (41 KTS)
Pull-up (Flaps lowered)	75 Km/h (43 KTS)
Maximum demonstrated crosswind	28 Km/h (15 KTS)

4.2 PREPARATION FOR FLIGHT :

Prior to each fight, the pilot much check the aircraft's suitability and also check the fuel level on board.

All of the checks included in this section must be carried out before every flight, even if the last flight was very brief.

4.2.1 Remove all protections :

- pilot cover
- wheel – block
- mobile surface – block
- windbreaker cover
- propeller protection

4.2.2 Refuel :

Check that the quantity of fuel in the tank is sufficient for the scheduled file, otherwise refuel. Make sure that the fuel pipes are connected safely. Unscrew the double tank plugs located to the sides of the hull next to the seats and proceed with refuelling. It is recommended to first mix the gasoline

with the oil suitable for a two-stoke engine before adding it to the tank if the aircraft does not have a separate mixer.

PRUDENCE
pay attention during refuelling procedure to not pour fuel on the windscreen, this because it is not fuel-proof. This can cause damages to the windscreen and it can be broken.

PRUDENCE
It is strongly advised not to use the two tanks simultaneously .

PRUDENCE
carry out the refuelling operations by first establishing an earth connection to the aircraft, using the engine as an earthing point. Check the quantity of fuel on board, carefully follow the refuelling operations, checking the increase of the fuel level in the tanks in order to avoid fuel from escaping, with the related risk of fire or environmental pollution.

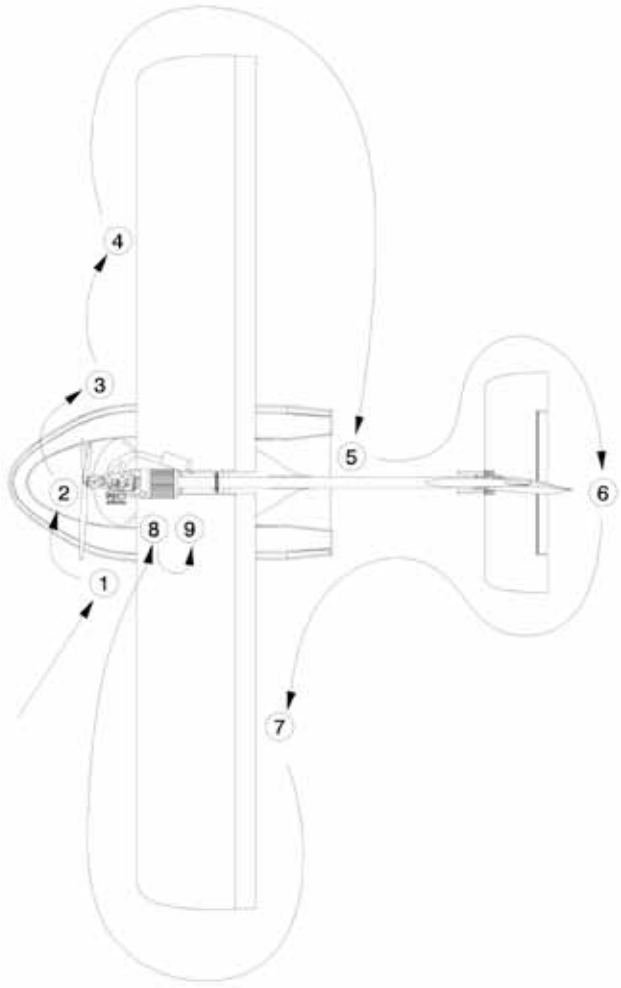
4.2.3 Drain the tank :

The draining procedure must be performed before the first flight of the day, 10 minutes after refuelling and between two flights, if the aircraft remains parked for a period of time that exceeds 3 hours. Simply let 80/100 cc of fuel exit the specific cock under the gascolator filter located in the hull , right side under the instruments' panel, turning the latter forward. To perform the operation, use a transparent container for hydrocarbons. If you note the presence of water, repeat the operation multiple times until all of the water has been discharged. Dispose of the drained fuel without causing harm to the environment.

PRUDENCE
It is recommended to perform this operation before moving the aircraft to prevent the condensation water present on the botton of the tanks to emusify with the fuel.

4.3 Inspect the aircraft :

The purpose of the pre-flight inspection is to identify instrument damage or any type of anomalies, none excluded, that could place the flight, the pilot, the passenger or third parties at risk. The pilot is responsible for the pre-flight inspection. This procedure does not require any particular equipment; a flashlight may be useful for the dark corners. Carry out the checks listed below with maximum accuracy and exactness.



1	**Left side of the fuselage:**
Hull, nose fairing and windshield:	intact and without microfractures or delaminations
Wing strut nuts:	locked
Fuselage and wing struts:	intact, without inflections
Fuselage rivets:	intact
Front and rear landing gear:	
Mechanism:	operating, without distortion or play, clean and free of foreign objects
Wheel rotation pin nut:	locked
Landing gear compartment :	intact and clean
Tyre:	intact and at a correct pressure
Hub and brake	intact
Nylon brake control tube:	intact and without bends

Brake:	no oil leaks
2	**Engine and propeller**
Engine:	clean, without signs of liquid leaks or blow-bys
Coolant tank and pipes:	intact, level control, no leaks
Radiator:	no leaks or obstructions
Muffler and manifold:	intact, well coupled, no cracks
Carburetors:	clean, undamaged, correctly fastened to the engine, choke and throttle cables not worn and correctly positioned.
Silent-block :	intact rubber section and correctly fastened
Propeller:	clean, without delaminations or breaks
Propeller hub bolts:	locked
3	**Right side of the fuselage:**
Hull, nose fairing and windshield:	intact and without microfractures or delaminations
Wing strut nuts:	locked
Fuselage and wing struts:	intact, without inflections
Fuselage rivets:	intact
Front and rear landing gear:	
Mechanism:	operating, without distortion or play, clean,
free of foreign objects Wheel rotation pin nut:	locked
Landing gear compartment :	intact and clean
Tyre:	intact and at a correct pressure
Hub and brake:	intact
Nylon brake control tube:	intact and without bends
Brake:	no oil leaks
4	**Right wing**
Wing surface	no bulges, depressions or delaminations
Trailing and leading edges	intact, no residual deformation
Wing-fuselage connections	fastened correctly, without deformations
Ailerons	upward and downward freedom of movement without excessive play on the hinges no cracks near the connections no lateral movements
Control rods	integrity and correct fastening, smoothness and freedom of oscillation
Hinge supports	firmly fastened to the wing
Counterweights	fixed, without play
Anemometer probe	intact, aligned with the aircraft axis, no obstructions
5	**Rear fuselage section**
Fuselage-beam fastening rivets	intact
Hull rudder	intact and functioning
6	**Tail**
Vertical fin	no buckling or delaminations, fastening rivets without play
Rudder	no delaminations, correct fastening
	check hinges integrity **PRUDENCE** do not force the rudder
Bowden cables	correctly fastened

Flying tail	free movement along the entire stroke, without buckling
Flying tail hinge	correct fastening, without play, no welding cracks
Flying tail counterweights	correct fastening, without play, no welding cracks
Hinge pin nuts	correct fastening
Trim tab	intact, free movement
Flying tail trailing edge	no buckling or delaminations
Stabilator trailing edge	no buckling or delaminations
7	**Left wing**
Wing surface	no bulges, depressions or delaminations
Trailing and leading edges	intact, no residual deformation
Wing-fuselage connections	fastened correctly, without deformations
Ailerons	upward and downward freedom of movement
	without excessive play on the hinges
	no cracks near the connections
	no lateral movements
Control rods	integrity and correct fastening, smoothness and freedom of oscillation
Hinge supports	firmly fastened to the wing
Counterweights	fixed, without play
8	**Cabin controls**
Instrument panel	correctly fastened, all plates present
Battery ON	instruments ON
Battery OFF	instruments OFF
Control stick	freedom of movement, correct fastening of supports
Rudder pedals	fastened, no distortions, functional test
Throttle	freedom of movement, correct fastening of supports
Brake	functional test
Manual trim	position, function check
Seat belts	function and anchoring check
Seats	correct fastening
9	**Electric system**
9.a) BATTERY	Clamp tightened.
	Cables connected and screws tightened. No oxidation or electrolytic phenomenon For acid batteries, level of the liquid within the tolerance.
9.b) ELECTRIC MOTOR CONNECTION	Coil cables inserted.
	Coil and spark plug cables dry and without evident damage. Spark plug pipes tightened.
	Spark plug base thermocouple cable tightened.
	Starter motor cables connected and tightened.

4.4 BEFORE TAKE-OFF :

During flight and when moving the aircraft, the use of a helmet is mandatory and the seat belts must always be used and fastened.

4.4.1 PRE-STARTUP CHECKS

Pre-flight inspections	Completed
Seats	Adjusted
Seat belts	Fastened and well tightened
Parking brake	Engaged
Controls	Free
Fuel tank selector	The fullest is open, the other closed
Trim	Neutral position
Retractable landing gear selector position:	DOWN on the ground, UP in water

4.4.2 STARTING

Master	ON	
Generator indicator light	ON	
Parking brake	Engaged (if on the ground)	
Throttle choke:	engine cold, ON	(fully back)
	engine hot, OFF	(fully forward)
Electric fuel pump	ON for 15 sec. then OFF	
Throttle	Minimum	
Magnets	Both ON	

PRUDENCE

check that the area near the propeller is clear and never abandon the aircraft with the engine on. Remember that, when in water and once the engine has started, even if at reduced power, the aircraft tends to float. YELL: KEEP AWAY FROM THE PROPELLER!

Press the START button Max 20 sec., followed by a cooling period of 1 minute for each attempt

Throttle	with the engine started, position 2500 rpm.
Generator indicator light	Off

4.4.3 PRE-TAXIING

Avionic devices	On
Navigation instruments	Checked
Flaps	Take-off position
Parking brake	Disengaged

4.4.4 TAXIING /FLOATING

a) Taxiing

Brake	Check efficiency
Mobile surfaces	Check complete excursion
Flight instruments	Check operation and coherence
Throttle:	As necessary to maintain a taxiing speed no greater than 5 km/h

b) Floating

Floating refers to all aircraft movements in the water. Once in the water, remember that if the aircraft is not tied up, it is at the mercy of the forces exercised by the wind, waves, marine current and inertia, which must be managed and corrected with the traction generated by the propeller and the use of the marine and/or aerodynamic rudder. Furthermore, amphibious aircraft are optimal weathervanes, in fact if left free to move, they position themselves spontaneously with their nose to the wind.

During manoeuvres, always remember that the turn radius increases as speed increases. At a high speed, the aircraft's inertia makes it tend to maintain the same direction. Unfortunately, there are no brakes in water, therefore near to shore or obstacles of various types, it is always best to proceed with caution at a low speed.

CAUTION

when floating, try to avoid water sprays from hitting the propeller when moving, reducing the movement speed as the sprays are not only harmful to the blades, if launched from the propeller flow at a high speed, they could cause damage to the aircraft.

There are three types of movement in the water:
Engine at a low speed, therefore low speed, direction set mainly by the hull rudder, which must be lowered by keeping the lever located between the seats pulled back, near the brake lever, and by pulling up on the control stick, keeping the nose lowered. At a low speed, the tail rudder is inefficient. This technique is particularly recommended when moving in small and crowded spaces, in fact it reduces the risk of hitting obstacles as the aircraft accumulates little inertia.

To increase speed, increase the power with the control stick always pulled up, which causes the hull to lift up the nose and the aircraft will be unbalanced towards the back. This technique is used when moving in wavy water, as it keeps the propeller away from the sprays.

When the water conditions permit it and the aircraft must be moved for a long distance that is not crowded, it is best to float gliding. Apply maximum power, pulling up on the control stick, as when taking off and when the aircraft reaches the gliding speed, keep only a minimum part of the hull in contact with the water, reducing the power to a value that makes it possible to maintain the obtained speed. When using this technqiue, retract the hull rudder to prevent it from being damaged, also because it is not of much use at high speeds.

PRUDENCE

In the case of strong side winds, float at a low speed, using the power cautiously, as the aircraft could capsize. Always turn at a low speed, max 3km/h.

4.4.5 ENGINE TEST on ground and in water

Parking brakes	Engaged (on ground, N/A in water)
Fuel tank selector	The fullest is open
Temperature and pressures	In the green arc or within the limits
Trim	Neutral position
Controls	Free
Magnets :	at 4000 rpm removing them one at a time, there must be a maximum decrease of 300 rpm per magnet
Throttle	Fully forward, maintain 6000 rpm +/- 150 for 5"
Minimum RPM	2000 rpm, check minimum

PRUDENCE

in the water, the engine test causes significant acceleration! Always carry it out in an area free of obstacles and upwind !

4.5 TAKE-OFF :

4.5.1 BEFORE TAKE-OFF

Flight controls	Free
Trim	Neutral
Electric fuel pump	ON
Flaps	Take-off position
Fuel tank selector	The fullest is open
Engine instruments	Within limits for take-off
Flight instruments	Check and adjust
Seat belts	Fastened and well tightened
Parking brake	Disengaged (N/A in water)

4.5.2 TAKE-OFF

Aircraft	Aligned with the runway axis and against the wind
Throttle	Fully forward in 3-4"
At 70 km/h	Turn in take-off attitude
Accelerate	Vx or Vy
Flaps	fully lowered
Trim	As necessary
Throttle	As necessary
Electric fuel pump	Off at 500 ft.

4.5.3 TAKE-OFF from WATER

The take-off procedure is very different than when taking off from the ground. Particular attention must be placed on the wavy motion of the water surface, the direction of the wind, the marine current and look for an area suitably distant from the shore and free of obstacles to perform it in complete safety.

PRUDENCE

Before alighting or taking off from water, always make sure that the landing gear is retracted. An attempt to take-off with the landing gear extracted could cause the aircraft to overturn!

The condition of the water surface can be classified in three ways:

Flat surface:	no waves
Wavy surface:	wavy motion with sprays of foam
Agitated surface:	wavy motion with a pronounced surface coverage of white foam

PRUDENCE

It is prohibited to take-off when the water surface is agitated. Avoid landing on water when the surface is agitated. Maximum wave height permitted 35 cm.

Always take off against the wind if possible. If the water surface does not have a wind sock, the wind's direction can be assessed by observing flags, boat sails, smoke, tree leaves and the streaks on the water surface.

Before taking off, foat along the section to be used to make sure that there are no obstacles and that it is free until the end of the takeoff.

PRUDENCE

Please remember that when taking off from a flat water surface, the aircraft needs a longer take off area as the adhesion forces of the water on the hull increase, arriving to extreme cases in which taking off it not possible.

Both when taking off or when alighting, pay attention to the possibility of porpoising, which is a type of dynamic instability caused by wavy motion, where the hull first bounces forward and then backward on the water. The frequency of this oscillation depends on the speed of the aircraft, therefore at high aircraft speeds it becomes difficult to control, with serious risks of overturning and hull yielding. To prevent this from occuring, move the control stick slowly, avoiding pulling up or diving suddenly. If the porpoising phenomenon is not corrected in time, it will continue to increase. Therefore, as soon as the pilot notices that the oscillation cannot be controlled, power must be reduced, pulling up slightly until returning to the initial floating position.

4.5.4 TAKE-OFF TECHNIQUE FROM THE WATER

Align the aircraft against the wind in an area free of obstacles.

Fully open the throttle in progression within a few seconds.

During the first phase of the take-off run, keep the control stick at the belly until the aircraft's nose exits the water and starts the gliding phase.

While gliding, return the control stick to the center and let the aircraft accelerate until you notice a clear sensation of a decrease in friction and the speed stabilises.

At this point, pull up softly until arriving to the end of stroke and wait for the separation from the water. In this phase, the force on the stick increases considerably.

NOTE

quickly pulling up on the stick will cause an increase in resistance, causing speed to reduce and making the separation more difficult.

4.6 CLIMB

Engine	6500 rpm
Engine parameters	within limits of use
Trim	As necessary

4.7 CRUISING

Throttle	Max continuous power 6500 rpm
Engine parameters	Within limits

PRUDENCE

Frequently check the fuel levels in the tanks, selecing the appropriate tank to use. It is extremely advisable not to use the two tanks at the same time, as if fuel runs out in one of the tanks, this could cause the engine to shutdown due to a lack of fuel.

PRUDENCE

Flying during a rain squall reduces the aircraft's flight performance and the stall speed increases in a considerable manner. Plus, visibility is reduced. It is prohibited to fly when it is raining.

4.7.1 FLIGHT WITH TURBULENT AIR CONDITIONS

PRUDENCE

In conditions of turbulence and/or wind gusts, reduce the speed by keeping the flaps in the cruising position and adjust speed below the normal manoeuvering speed.

4.8 DESCENT

Altimeter	Check the QNH value
Throttle	As necessary
Trim	As necessary
Engine parameters	Within the limits

4.9 LANDING AND ALIGHTING ON WATER

4.9.1 LANDING

CAUTION

With regard to the typical landing and alighting on water distances, see section 6 Performance.

Speed	80 km/h
Flaps	fully extended
Trim	As necessary
Throttle	As necessary
Landing gear	Extended for operations on the Ground
	Retracted for operations on the water
Auxiliary fuel pump	ON

Hydraulic brake test	Carry it out, keeping the system pressurised
Final approach speed	70 km/h
Landing speed	65 km/h

NOTE

a) In conditions with strong cross wind or gusts, or in the case of wind-shear, increase the final speed by at least 10 km/h.
b) Brakes: perform a system pressurisation test, pulling the brake lever to the end of stroke position a few times, to check its correct operation (the lever must encounter resistance, a sign of a pressure increase in normal operation).

4.9.2 ALIGHTING ON WATER

The alighting on water procedure is similar to landing on the ground. Pay particular attention however to the wavy motion of the water surface, the wind direction and look for an area suitably distant from the shore and free of obstacles.

PRUDENCE

Before alighting on water, also make sure the landing gear is retracted. Alighting on water with the landing gear extracted could cause the aircraft to overturn or hull yielding!

Alighting on water is carried out with the flaps completely lowered, decreasing the engine and pulling up slightly in a ground-effect in order to come into contact with the water with the hull's tail, without risking bouncing or, even worse, overturning forward.

Alighting on a flat surface is a very deceptive and dangerous situation. The physiology of the human eye also prevents the most expert pilots from correctly perceiving the depth without significant projections on the water surface. In these conditions, it is easy to perform an incorrect approach, risking a stall at an altitude of a few metres, resulting in a belly flop and probable overturning. In these conditions, monitor the altimeter often, or orient yourself using the shores, using elements on the ground such as trees, buildings, high ground, etc. as a reference.

Also prior to alighting on water, the landing area should be flown over in order to view any obstances or possible landing problems.

In the case of TOUCH & GO :

Flaps :	completely lowered

Then repeat the take off procedure (see relative paragraph)

4.10 OPERATIONS AFTER LANDING, ALIGHTING ON WATER

4.10.1 AFTER LANDING

Throttle gas	To minimum
Flaps	UP
Taxiing	Free the runway as soon as possible
Electric pump	OFF
Brakes	Check "hot" brake efficiency

4.10.2 AFTER ALIGHTING ON WATER

Throttle gas	To minimum
Flaps	UP
Floating	Float at a moderate speed
Electric pump	OFF

4.10.3 SHUTTING OFF THE ENGINE on the ground/water

Throttle gas	To minimum
Parking brake	Engaged (if on ground)
Electric equipment	OFF
Magnets	OFF (one at a time)
Master	OFF
Fuel tank selectors	both OFF

4.10.4 MANUAL MOVEMENTS ON THE GROUND

Instructions for moving the aircraft on the ground with the engine off:

- Disengage the parking brakes if engaged
- Take the aircraft by the tail boom and press downward to raise up the front wheel.
- Make sure there are no obstacles, animals or people nearby
- Push or pull the aircraft, making it rest only on the main landing gear
- Engage the parking brakes once the target destination has been reached.

A pin system on the front wheel is also availalbe for the tow hook when moving the aircraft on ground (optional).

4.10.5 MANUAL MOVEMENTS IN WATER

When it is necessary to dock in an area that is crowded or that has obstacles, it is best to make movements manually.

Instructions for moving the aircraft in the water with the engine off:

- Tie a rope the the front connection on the hull
- Go on shore or on the pier and move the aircraft by pulling the rope, being careful not to make it collide with obstacles of any type.
- Throw the anchor, tie the rope used previously to any solid and resistant object, or pull the aircraft ashore.

4.10.6 ANCHORING ON THE GROUND

The aircraft is anchored first by positioning the parking brake to ON, then tying the cords to the upper connections of the struts on the outer wings. A third anchoring point may be the flying tail hinge, or the steel ring located on the nose of the hull. When tying the rope on the ground, make sure not to tension it too much. A little force is sufficient for secure anchoring and will not risk damaging the aircraft, especially in conditions with strong wind.

CAUTION

It is a good habit to tie the control stick to the seat belts when the aircraft is left in windy conditions, which prevents the mobile surfaces from violently impacting against the stops.

4.10.7 ANCHORING IN WATER

In water, the aircraft can be temporarily anchored by throwing the anchor. However, it is advised not to abandon the aircraft in conditions of strong wind or wavy motion if anchored only with the anchor. In these cases, it would be better to secure the aircraft with the lines on the hull connections, blocking the mobile surfaces, also by only tying the control sticks to the seat belts.

It is always best to pull the aircraft onto the shore rather than anchor it in water, as strong wind or strong waves could cause the hull to collide with surrounding objects, which may not be seen because submerged, damaging it. If it must be anchored in water, for example to a pier in adverse weather conditions, it is advised to place polystyrene blocks or other materials that absorb impacts around the perimeter of the hull or on the pier.

4.11 LANDING GEAR AND RUDDER EXTRACTION AND RETRACTION PROCEDURE

4.11.1 LANDING GEAR EXTRACTION AND RETRACTION

Use the specific switch on the control panel to extract or retract the landing gear.

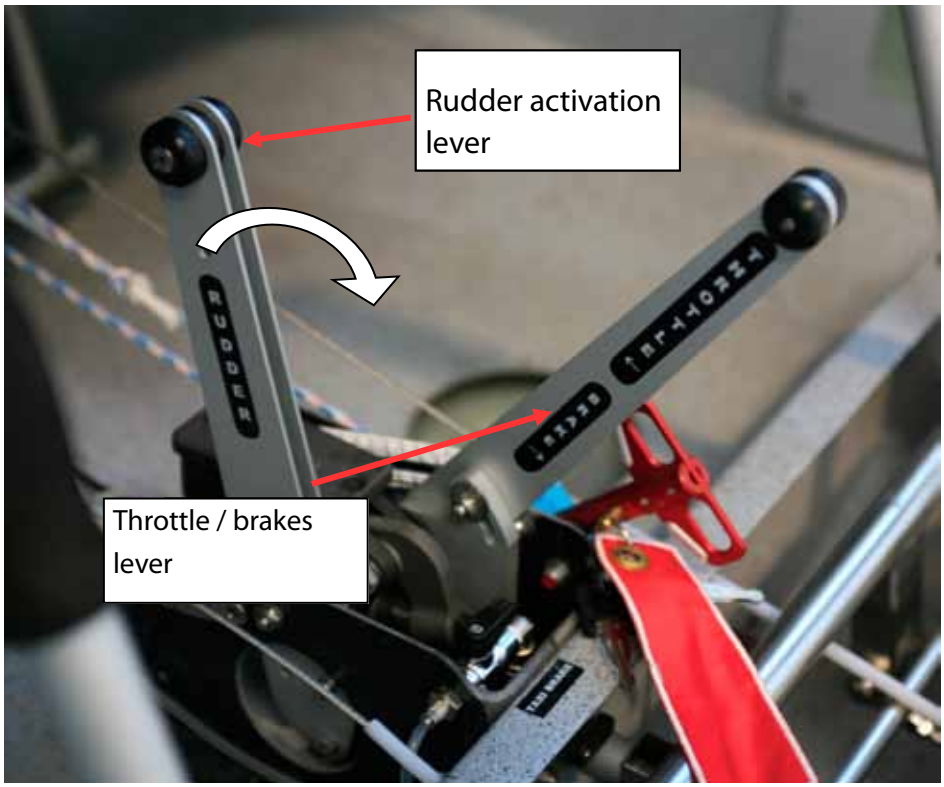
To extract the landing gear push downards the switch lever. The redlight turn on only if all three wheels are completely extracted.
To retract the landing gear pull the switch lever upwards, when all the three wheels are completely retracted, the greenlight will turn-on.

NOTE

The luminous landing gear position indicators are inverted in comparison to traditional ground type aircraft with retracting landing gear as the most dangerous phase is to alight or try to take off from the water with the landing gear extracted.

4.11.2 RUDDER EXTRACTION/RETRACTION AND USE FOR WATER OPERATIONS

To extract the marine rudder, pull back the left lever located on the floor in front of the seats in a central position. Keep the lever pulled back the entire time the rudder is used. When the lever is released, a return spring will return the rudder to the flight position (retracted position).

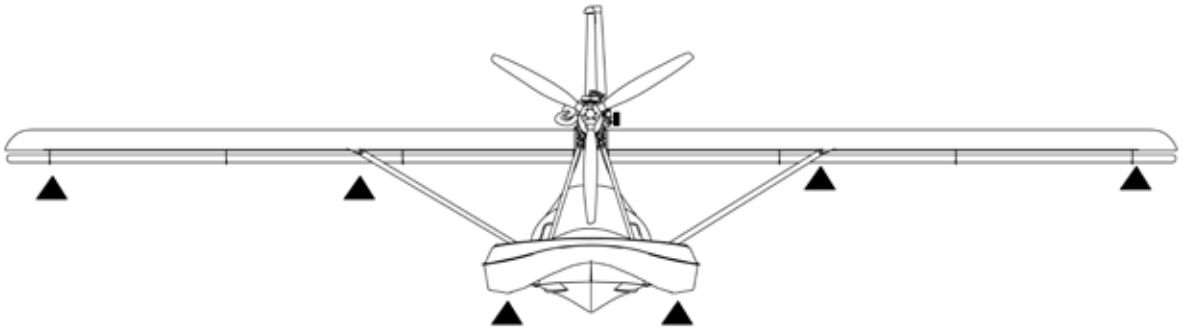


4.12 LIFTING POINTS

The Catalina airframe and hull are designed for distributed loads, so lifting it in wrong points could damage it. It is necessary to always use some polystyrene blocks or similar to distribute the loads.

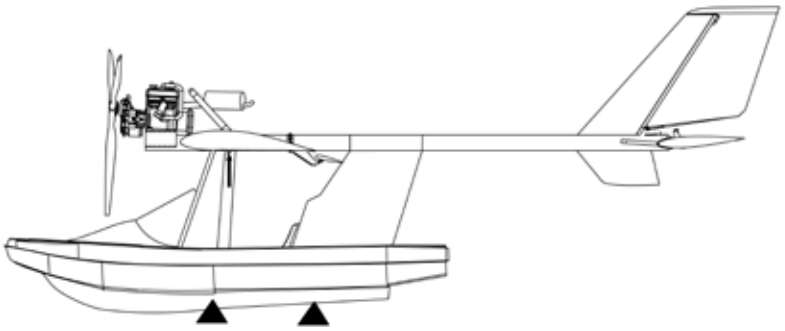
The lifting points for the Catalina are:

4.12.1 On the airframe:



- The connecting point between wing and bracing struts
- The wing tip in the correspondence of the last rib (located in correspondence of the last flapperon pylon) distributing the load

4.12.2 On the hull:



- In correspondence of the wing bracing strut attachment
- In correspondence of the main wheels supporting boxes

Fly Synthesis will not take any responsibility from damages occurred by lifting the aircraft in points different from the ones reported above.

ATTENTION

The wings folding operations must be done only on ground, in a suitable place sufficiently broad. The folding on water It is strictly forbidden because of the risk of overturning.

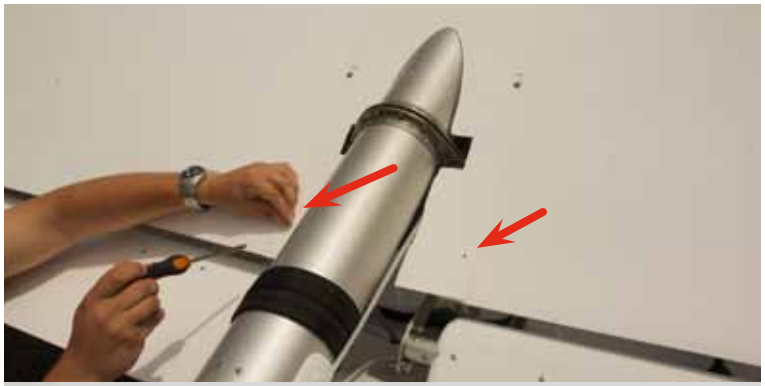
ATTENTION

If the plane has low fuel quantity (less than total fuel tanks capacity) anchor the plane on ground using the steel hook located on the hull's bow.

Position the wings supporting device on the tail beam and lock it with the proper ratchet.

Tighten the ratchet as needed, without overdo.

Position the strap, which keeps the stabilator in right position, as shown in the pictures. The anchor of the strap on the stabilator mass-balance must be at the middle of the mass-balance.



Remove covering between the wings on the tail beam. To do it, remove the 2 locking screws using a Phillips screwdriver. Slip off the covering rearward till all the holes are free, as shown in the picture.

NOTE
Put the screws in a secure place

Lift the covering and remove it.

Using the 2 provided size 10mm spanners, remove the bolt which connects the control rod and the aileron bellcrank.

NOTE

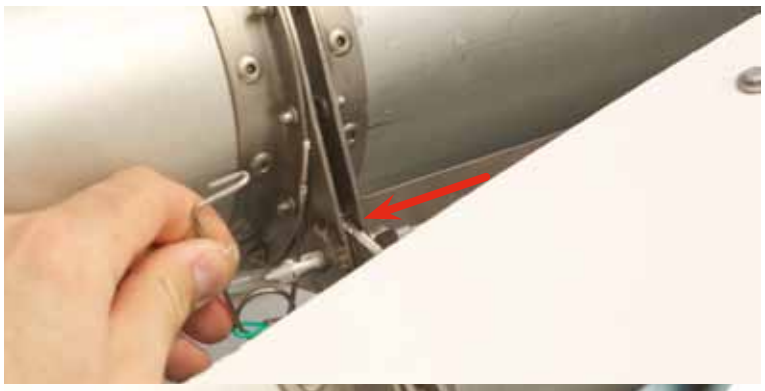
Put the nut to the screw on the aluminum bellcrank. This is needed to maintain the aileron in the right position.

ATTENTION

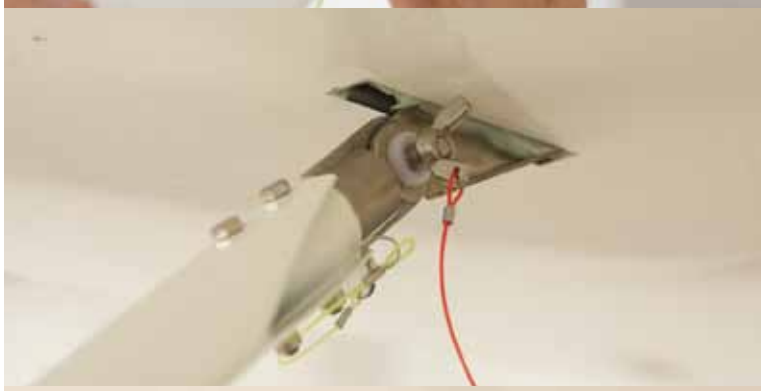
In this phase do not lose nuts or washers.

Remove all the safety locking pins to the wing-tail beam attaching point joints.

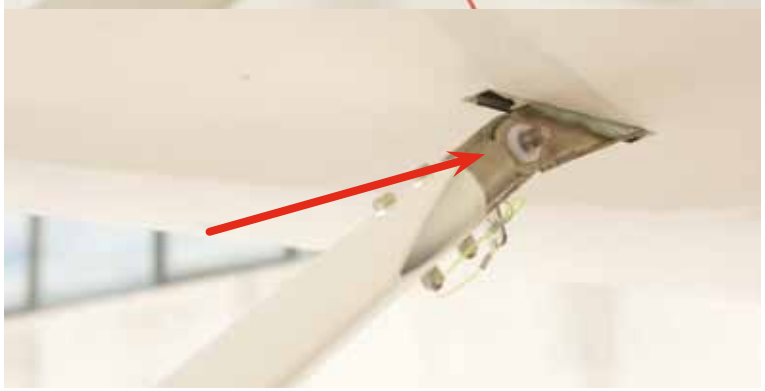
Front connecting point.



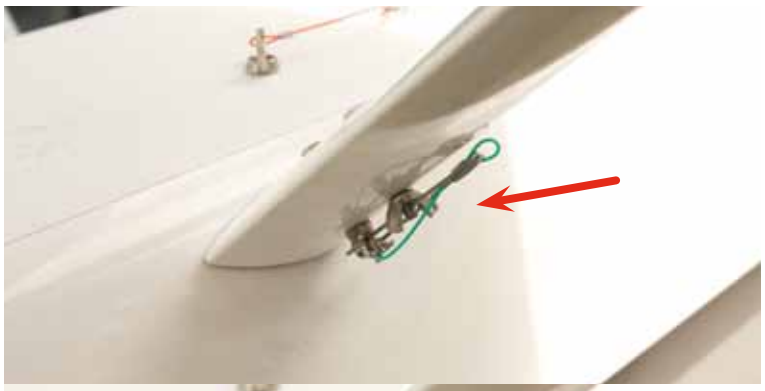
Rear connecting point.

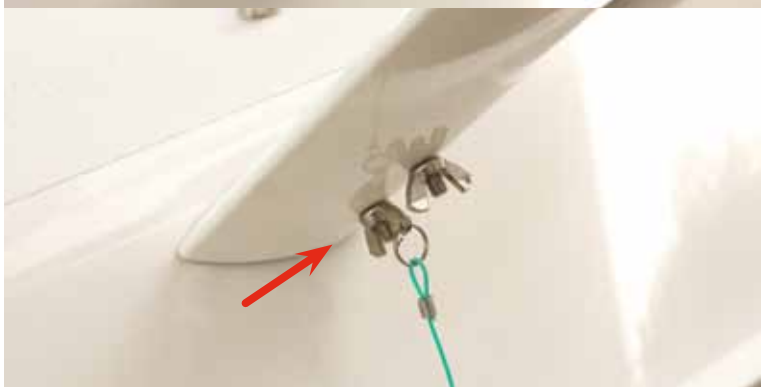


Remove the safety pins on the upper brace rod connecting point.

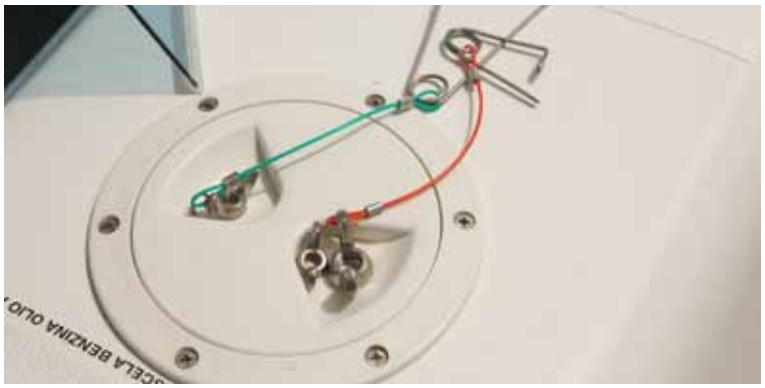


Remove the wing nut paying attention to not lose the nylon washers.

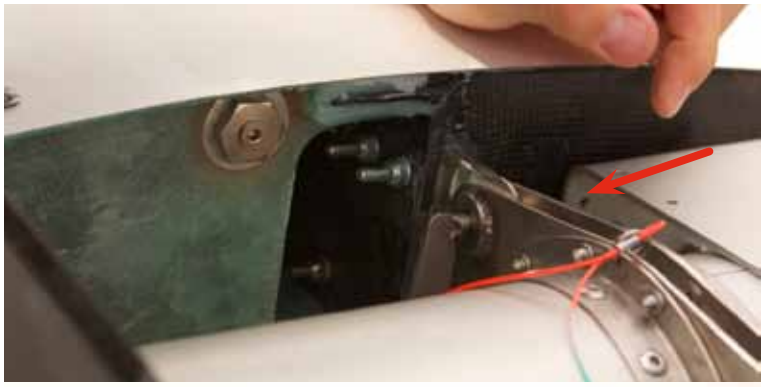


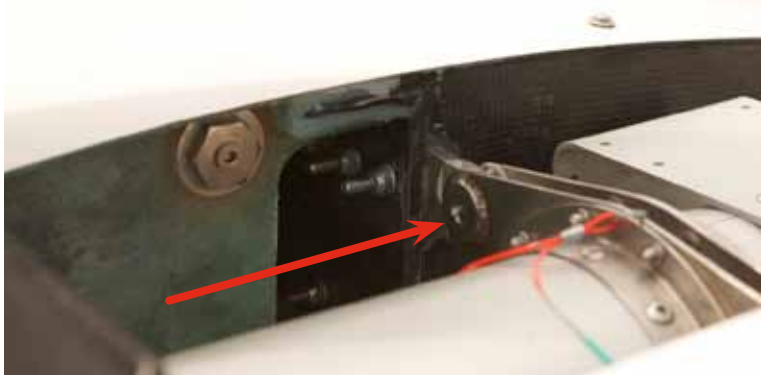


Remove the safety pin on the 2 bolt on the lower attachment point of the brace rod, and remove the respective nuts.

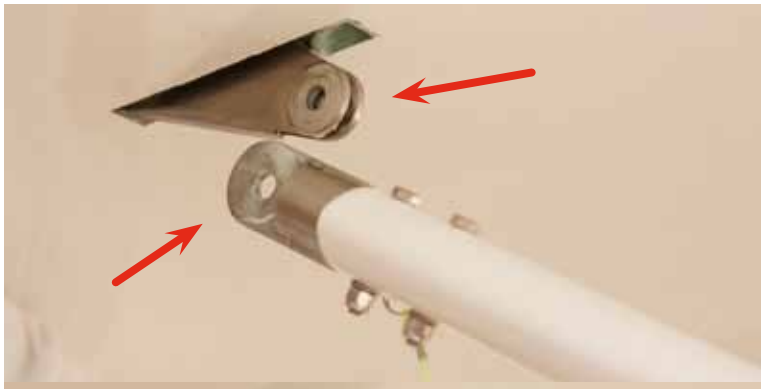


Put the nuts and the safety pins in the provided bag or put them temporarily in the fuel cap cover indents, in order to not lose them.

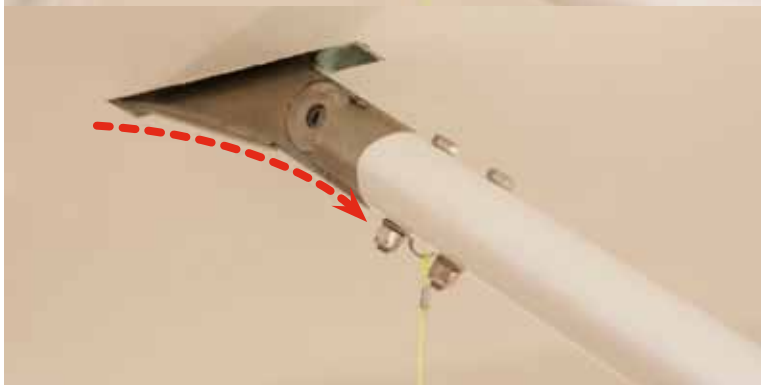




Remove the front root wing attachment point; if some difficulties are encountered in this phase, lifting a bit the wing leading edge will help to loosen the pin. To ease the pin removal, go up the hull, and remove the pin from the upper side of the wing.



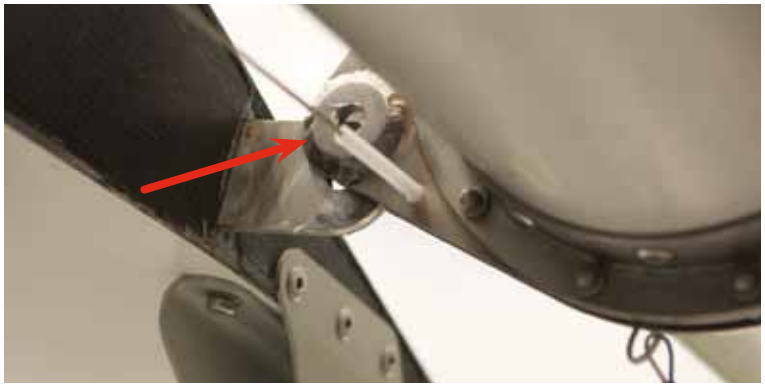
Go to the wing strut attachment and lifting the wing with one hand, remove the threaded pin.



Lean the wing on the bracing strut so it is between the two plates of the wing attachment points, as it is shown in the picture.

ATTENTION

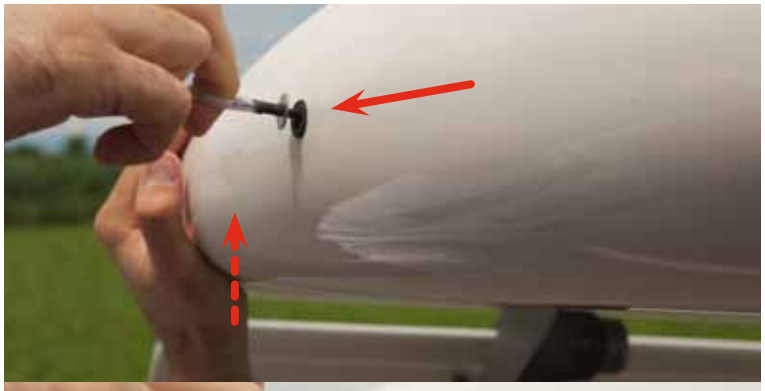
Before proceeding with other operations, be sure that the bracing strut is perfectly inserted between the two wing plates. If not, the wing could fall down and damage itself.



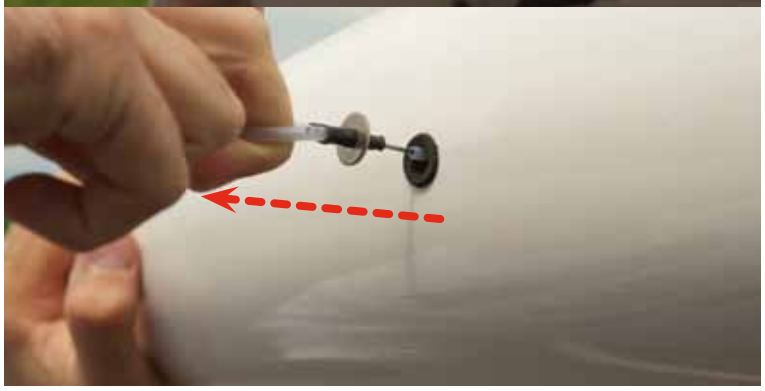
Go back to the wing root and remove the rear attachment point. If difficulties are found try to push the wing forward, lifting it with one hand. Pay attention to not allow it to fall down the bracing strut.

ATTENTION

When the rear pin is removed the wing tend to rotated and fall down. Support it firmly to avoid damages.



Keeping the wing in equilibrium, go to the wing's tip.



Supporting the wing with one hand, lift it a bit and unlock the folding system pulling the cable on the wing tip.

Pull the wing outwards up to the stop, helping if it is necessary pulling the unlocking cable.

ATTENTION

During the wing extraction and rotation process, the wing must be kept lifted in order to avoid collisions with the upper part of the bracing strut. If not severe damages will occur to the wing.

Rotate a bit the wing on its axis with the leading edge downwards.
Drive the wing to the tail paying the maximum attention to pass over the bracing strut.

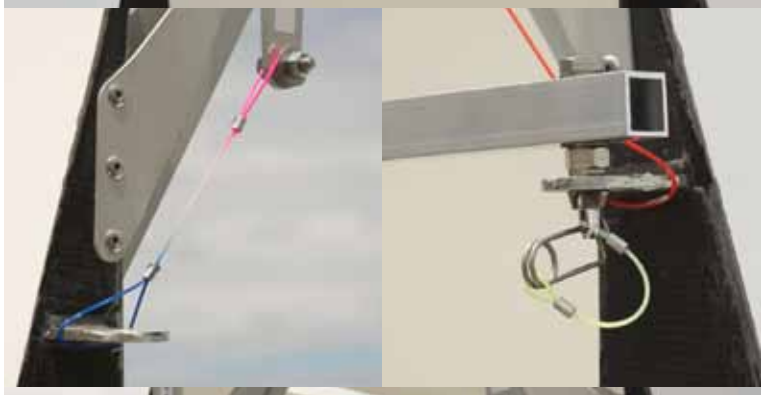
Rotate completely the wing with the leading edge downwards, so it is vertical.

Rotate it toward the tail and place it on the supporting device putting the leading edge into it.

ATTENTION

To avoid that the mass balances will interfere during the folding operations of the other wing, push the folded wing forward up to the stop. In this way the two wings will be not aligned.

Put the provided cable to keep the aileron in the neutral position as shown in the picture.



Fold the other wing following the same procedure.

ATTENTION

During the folding of the wing, the aileron is free to rotate around its axis. The balancing masses may hit or hook on the other wing during the wing's positioning on the supporting device.

Link the rear root attachment points with the provided device and tighten the related nuts.

Remove the bracing struts and place them into the hull as it shown in the picture.

ATTENTION

Pay attention that in the left bracing strut is present the pitot tube line. So, slide off the bracing strut without forcing and then disconnect the rilsan tube.

ATTENTION

Cover the rilsan tube of the pitot in order to avoid that foreign object could obstruct it or water could enter into it.

4.14 To reset the plane in flight configuration, follow the instructions above in reversal order.

4.15 While moving the plane with folded wings, pay attention that the load on the front wheel is very low. Keep firmly the plane during ground movements to avoid that, because of even small subsidence, the plane could fall down with rear part and damage the hull's tail .

EMERGENCY PROCEDURE

5

5. Emergency Procedure

Emergency situtations are very rare if the pilot carries out the pre-flight aircraft checks very carefully, also carrying out ordinary and, if necessary, extraordinary maintenance. Emergencies due to poor weather conditions may be minimised or eliminated by carefully planning the flight and/or with common sense. The following section contains the operations to carry out to the letter in the case of emergency situations. The latter are divided by type :

ATTENTION

the multifunction instrument indicates if parameter threshold has been exceeded, completely turning the indicator bar black. If the parameter is within the limits, the indicator bar is dotted.

5.1 EMERGENCY PROCEDURE ON THE GROUND

5.1.1 ENGINE FIRE

Fuel cocks	Closed
Auxiliary fuel pump	Off
Engine throttle	Stop
Key with magnets	OFF
Master switch	OFF

Engage the parking brake (if on the ground)
Abandon the aircraft as soon as possible
If available, use a fire extinguisher to put out the fire.

5.2 EMERGENCY PROCEDURE DURING TAKE-OFF

5.2.1 TAKE-OFF INTERRUPTION (before lifting off from the ground/water)

Engine throttle	Fully back
Brakes	Brake without locking the wheel (on the ground)
	Pull up the aircraft (on water)
Flap	Retract
Magnets	Off
Master	Off
Fuel selectors	Off

5.2.2 ENGINE FAILURE DURING TAKE-OFF (immediately after takeoff - altitude below 50 mt.)

Maintain a safety speed (in relation to take-off weight.
Select a location to land in the area in front of you, alter course max ±45° with respect to the original path, fly in a coordinated manner.
DO NOT TRY TO TURN 180° TO RETURN TO THE RUNWAY!

Fuel cock	Closed
Auxiliary fuel pump	Off
Battery and magnets	Off
Seat belts	Fastened and tightened

Abandon the aircraft after landing.

5.2.3 ENGINE FAILURE DURING (while climbing)

If the altitude permits it, proceed as follows:
Maintain a safety speed (in relation to the weight and configuration) and identify an area suitable for landing on ground or water

Best gliding speed	80km/h (Flaps retracted)
Auxiliary fuel pump	Check that it is on
Fuel level	Check amount in both tanks
Fuel cock	Check if the tank with the greater quantity is open
Fuel pressure	Check that it is within the permitted limits
Key with magnets	Check they are inserted
Engine throttle	Hot start position
Engine start-up	as indicated in the engine operating manual

- If the engine starts immediately, climb to a safety height and land ASAP for a detailed check.
- If the engine does not start immediately, select a suitable area for an emergency landing, avoiding tight turns and maintaining a suitable safety speed.

Flap	As necessary
Fuel cock	Close
Auxiliary fuel pump	Off
Key with magnets	Both Off

ATTENTION

Never perform a 180° turn at a low altitude to try to return to the runway.

5.3 IN-FLIGHT EMERGENCY PROCEDURE

5.3.1 ENGINE SHUTDOWN

Engine throttle	Check position and clutch
Engine instrument check	Check parameters
Choke control	OFF
Fuel cock	Select the tank with the greater amount of fuel
Auxiliary fuel pump	ON
Fuel pressure	Check that the values are within the limits
Key with magnets	Both / Check
Master	Check / ON
Throttle	Hot start position
Engine start	Proceed

If the engine restarts, check all engine parameters and land ASAP for a detailed check. Keep in mind that the engine could fail again, therefore maintain a suitable flight profile, preferring a route that has free space if an emergency landing must be performed.

ATTENTION
If the engine does not restart, prepare for an emergencing landing on the ground/water.

5.3.2 ENGINE FIRE

Fuel cock	Closed
Auxiliary fuel pump	Off
Engine throttle	Fully forward
Key with magnets	Off when the engine turns off
Best gliding speed	80 km/h (Flaps retracted)

Land immediately and do not try to restart the engine, even if the fire is put out
After landing, exit the aircraft immediately
If available, use a fire extinguisher to put out the fire.

ATTENTION
Do not try to restart the engine after a fire started, but prepare for an emergency landing.

5.3.3 RECOVERING FROM STALL

- Gently push the stick forward to eliminate the stall condition.
- Apply full power to minimise loss of altitude.
- Return to a level flight

5.3.4 RESTART from an involuntary SPIN

ATTENTION
NEVER try to stop the rotation by opposing the rotation direction with the ailerons.

Engine throttle	At a minimum
Flap	Retract
Rudder pedals	End of travel opposite to the rotation direction
Control stick	Neutral, slight nose down

When the rotation stops and is under control, return to a level flight.

ATTENTION
during the flare, after exiting the spin do not exceed the Vne.

5.3.5 FLUTTER :

This phenomenon may involve the ailerons, the flying tail, the trim tab and the rudder. It appears as strong vibration of the control surface during the flight, generally at high speeds.
To contrast this phenomenon, reduce the engine and pull up to reduce speed, being careful not to exceed the maximum permitted load factors. Land ASAP.

CAUTION
after a flutter, have the entire aircraft inspected by qualified personnel.

5.3.6 ELECTRIC SYSTEM FAILURE

SWITCHING ON OF THE GENERATOR VOLTAGE LOW LIGHT	
1. Voltmeter	Check
2. Unnecessary elelctric users	Off
3. Land	ASAP

The battery allows the actuation of flaps and auxiliary fuel pump for about 10 minutes. Are also allowed 2 complete extraction/retraction cycles. With the Master "OFF", to use emergency undercarriage extraction/ retraction procedure, press and keep hold the "emergency" button and act on undercarriage switch. It is necessary to keep hold the "emergency" button up to the extraction/retraction procedure is completed.

OVERVOLTAGE (voltmeter indication above 16 V)	
1. Master switch	Off
2. Voltmeter	Check the voltage drop
3. Master switch	On
4. Voltmeter	Check the voltage increase (within the limits)
If the previous point (4.) has a negative outcome, proceed as follows	
5. Exclude the electric equipment that is not indispensable for the flight	
6. Land ASAP	

The battery allows the actuation of flaps and auxiliary fuel pump for about 10 minutes. Are also allowed 2 complete extraction/retraction cycles. With the Master "OFF", to use emergency undercarriage extraction/ retraction procedure, press and keep hold the "emergency" button and act on undercarriage switch. It is necessary to keep hold the "emergency" button up to the extraction/retraction procedure is completed.

LOW VOLTAGE IN FLIGHT	
1. Possible causes	Excessive consumption (Too many electric users)
	Alternator failure
	Fuse interrupted
2. Land ASAP for a detailed control	

LOW VOLTAGE ON THE GROUND	
1. RPM	Increase above 4000@min
2. Navigation and landing lights	OFF
3. Voltmeter	Check if within limits
4. If the checks had a negative outcome	Shutoff the engine and have the electric system checked by specialised personnel

5.3.7 ELECTRIC SYSTEM FIRE

ATTENTION

An electric system fire can be recognised by white smoke and the characteristic odour of burnt plastic.

Master	Off
Electric users	Off
Land ASAP	

PRUDENCE

With the master "OFF", use the "emergency" switch for all the extraction/ retraction procedure. Configure the aircraft before turning the Master "OFF"

5.4 EMERGENCY PROCEDURE DURING LANDING

5.4.1 LANDING WITHOUT FLAPS OR WITH FLAPS BLOCKED IN AN INTERMEDIATE POSITION

1. Check the flap breaker	Engaged
2. Visually check the position of both flaps	- Check notches
3. Try to extract the flaps with the position selector	
4. If point (3.) is not possible, check that there is enough space free of obstacles to be able to land, maintaining a final speed that is 10 Kts higher than the standard.	

5.4.2 LANDING WITH A DEFLATED TYRE

Carry out a normal landing, if possible select a long and wide runway.
If the runway dimensions permit it, use the centreline of the runway opposite to that of the deflated tire.
Before touching down on ground, turn off the engine and the electric systems.
Land trying to keep the deflated tyre off the ground.
Prepare for a swing tendency from the side of the deflated tyre.
Maintain the direction using the rudder.
If the front wheel is deflated, lighten the front section, pulling up on the control stick, trying to keep the wheel in a central position.

5.4.3 FORCED LANDING

After carrying out the instructions in section 5.3.1"engine shutdown" without a positive outcome, proceed as follows :

Best gliding speed	80 km/h (Flaps retracted)
Seat belts	Well tightened
Engine throttle	Fully back
Fuel cocks	Closed
Auxiliary fuel pump	Off

Select the landing area, evaluating the origin and intensity of the wind and the absence of obstacles.

Flap	As necessary
Trim	As necessary

If possible, fly over the selected area, making sure that it is free of obstacles and safe for landing.

Final	Check the speed
Landing	Check the speed (minimum 85 Km/h with flaps)
Key with magnets and battery	Off

When coming into contact with the ground, keep the front wheel lifted as long as possible.

5.5 EMERGENCY PROCEDURE IN WATER

5.5.1 WATER INFILTRATIONS IN THE HULL

As soon as you notice water infiltrations, activate the bilge pump and try to plug the leak and go to the nearest mooring point. If you are in open sea or far from land, request help immediately from the Coast Guard and put on the lifejackets.

PRUDENCE

do not try to take-off with a leak in the hull, maintain position and request help. The aircraft could sink. Considering that the outer wings are semi-waterproof, the craft should generally float. In the case of sinking, abandon the aircraft cockpit and position yourself on the outer wings while waiting for help.

5.5.2 INCORRECT MANOEUVRES

If due to an incorrect floating maneouvre it is impossible to avoid an impact, the engine must be turned off, close the fuel cocks and set the master to OFF. This procedure applies to all types of unavoidable impacts, also on the ground.

5.6 PARACHUTE OPENING PROCEDURE (IF INSTALLED)

The emergency parachute is located in the rear part of the hull. The parachute is fixed to the aircraft by two kevlar straps, passing in the external part of the fuselage to the front and rear wing bayonet connections. The emergency parachute must only be used in the case of losing complete control of the aircraft.
If activated:

1. Turn off the engine (magnets OFF)
2. Pull out the red parachute strap postioned above the instrument panel at least 20 cm
3. Close the tank cocks
4. Tighten the seat belts
5. Turn off all users (Master OFF)
6. Crouch down and protect your face with your hands

For more information and notes regarding maintenance, refer to the enclosed parachute manual.

5.7 OTHER EMERGENCIES

5.7.1 LOW FUEL PRESSURE (if the optional fuel pressure indicator is installed)

Auxiliary fuel pump	ON
Fuel cocks	Open alternately for a flow rate check
Fuel pressure	Check limits

If the fuel pressure has not stabilised, land as soon as possible.

5.7.2 UNEXPECTED CONDITIONS OF ICE

It is prohibited to fly in conditions with ice, snow and rain. If weather conditions are encountered that favour the formation of ice, reduce altitude immediately. If ice forms on the bearing surfaces and planes, keep in mind the increase in the stalling speed as well as the increase in power necessary to maintain speed and a level flight. Aircraft manoeuvrability reduces drastically and in extreme cases, control of the craft can be fully lost.

Rpm	Maintain the highest engine power possible

Move the various control surfaces to prevent the formation of ice on the drive chain.

5.7.3 FORMATION OF ICE ON THE CARBURETORS

This is recognised by a decrease in engine revolutions with the throttle motionless. This may also occur on a humid day at low rpms.

Throttle	Fully forward to increase rpms

Restore normal flight conditions

5.7.4 ABNORMAL ENGINE VIBRATIONS

Check that vibrations decrease by reducing rpms
Land as soon as possible
Prepare for engine failure and a forced landing.

5.7.5 LANDING WITHOUT BRAKES

Look for a runway as long and grassy as possible (grass brakes).
Land with the flaps fully out at the minimum support speed.
After contact with the ground:

Battery and magnets	OFF

5.7.6 UNDERCARRIAGE SYSTEM MALFUNCTION

In case that the completed extraction/retraction indicator lights will not switch on, it is possible to by-pass the pressure control and regulation system of the hydraulic plant and force, within certain limits, the extraction or retraction of the undercarriage. To do this, see the following instructions:

- Position, if not already done, the undercarriage switch in wanted position (extract / retract).
- move up/down and hold the " Emergency" switch until the indicator light of completed extraction/retraction will switch on.

ATTENTION

Using the "Emergency" switch the plant pressure control system is by-passed, so to avoid damages of the undercarriage plant it is suggested to activate it for more than 10 consecutive seconds. The switch can be used both to lift or lowering the undercarriage. If necessary repeat the operation after a 10 seconds stop.

- After landing check carefully the hydraulic plant and the presence of dirt in the undercarriage vanes to identify the cause of the malfunctioning.

ATTENTION

If it is not possible to completely extract the undercarriage, to avoid severe damages to undercarriage and hull structure, retract the undercarriage and land on the hull on a grass runway.
To reduce the damages to the hull touch ground at 65km/h or less.

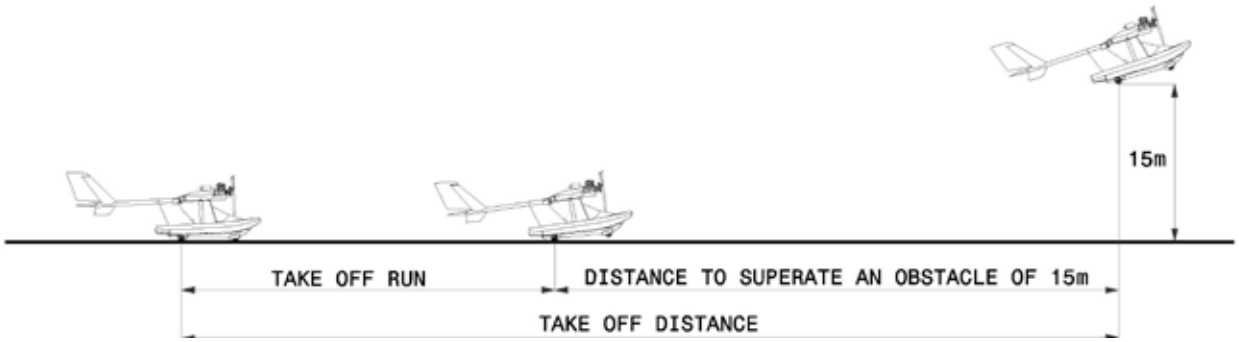
ATTENTION

If it is not possible retract completely the undercarriage (green light off) it is strictly forbidden to land on water. The risk of overturning is high. Extract the undercarriage (if possible) and land possibly on a grass runway.

6. PERFORMANCE

The tables and diagrams on the following pages were prepared to illustrate the performance that can be expected from CATALINA NG, in order to more precisely plan the flight. The data provided in these tables was obtained from tests carried out on a standard aircraft in optimal conditions and were adjusted to standard atmospheric conditions at sea level. The performance tables do not account for pilot ability or the maintenance conditions of the aircraft. The performance indicated in the tables can only be obtained if the indicated procedures are followed scrupulously and if the aircraft is in a good, efficient condition. Many variables, such as the engine's operative conditions or turbulence, could have an impact on performance, with particular reference to take off runs, climbing rates and in general to characteristic speeds.

6.1 TAKE OFF RUN ON GROUND DIAGRAM

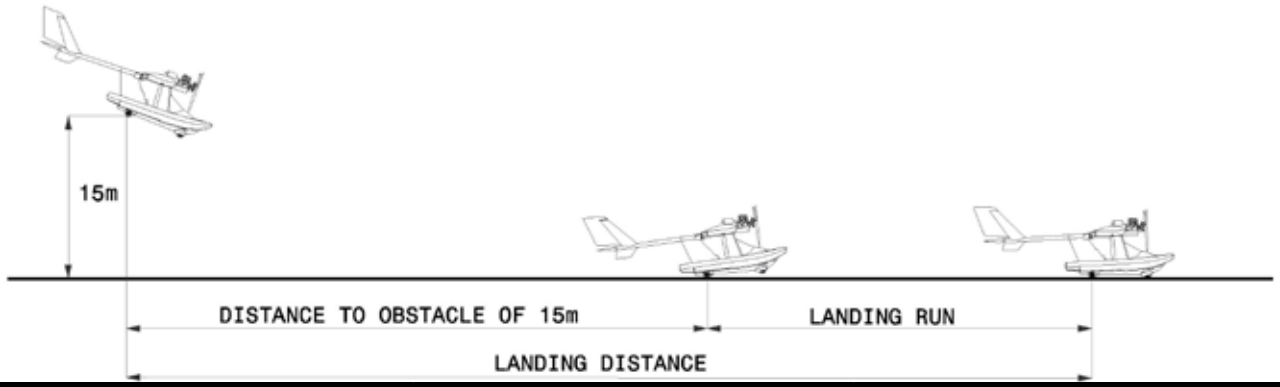


Take off run	Take off distance	Take off speed
130 m	350	80 Km/h

NOTE

The specified distance and speed values are approximate and may vary with the various configurations of the aircraft or different atmospheric conditions.

6.2 LANDING RUN, LAND, DIAGRAM



Landing distance	Landing run	Landing speed
295 m	150 m	75 Km/h

NOTE
The specified distance and speed values are approximate and may vary with the various configurations of the aircraft or different atmospheric conditions.

6.3 TAKE OFF RUN ON WATER DIAGRAM

Water run (take off run)	Take off distance	Take off speed
300 m	400	85 km/h

NOTE
The specified distance and speed values are approximate and may vary with the various configurations of the aircraft or different atmospheric conditions.

6.4 LANDING RUN ON WATER DIAGRAM

Landing distance	Landing run	Landing speed
265 m	120 m	70 km/h

NOTE
The specified distance and speed values are approximate and may vary with the various configurations of the aircraft or different atmospheric conditions.

WEIGHTS AND BALANCES

7

7. WEIGHTS AND BALANCES

This section includes the information needed to correctly balance and centre the aircraft.

PRUDENCE

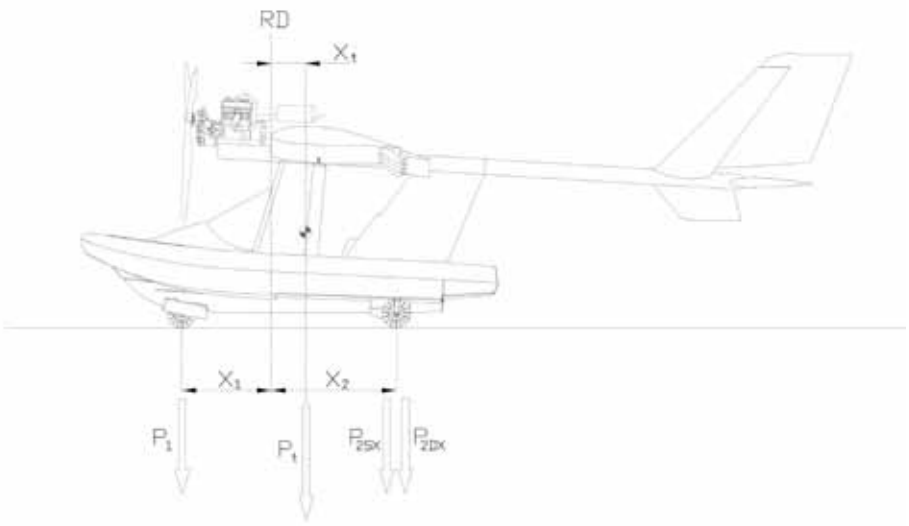
If the gravity centre limits are not taken into account, problems regarding aircraft stability and controllability can occur, with serious safety risks.

7.1 WEIGHING CONDITIONS

The following conditions must be satisfied to weigh the aircraft:
The equipment must be those foreseen in the list related to the aircraft in question
This must include brake fluid, engine oil, antifreeze and unused fuel
A scale with three independent sensors must be used, placed on the same horizontal plane as well as a plumb line.

7.2 CALCULATING THE CENTRE OF GRAVITY

As a reference for the subsequent measurements, the projection of the wings' leading edge will be adopted, marked using a plumb line. With respect to this reference, distances X1 and X2 are measured:



X1 is the distance between the centre of the front wheel and the reference
X2 is the distance between the rear wheel axle and the reference
The position of the centre of gravity in mm in reference to the chord is Xt = ML / PT.
Where: ML is the moment of the empty weight calculated as P2 * X2 - P1 * X1
With P1 = Weight measured under the nose wheel
P2= Sum of the weights measured under the rear wheels: = P2lh + P2rh
PT = Total weight, sum of the three measurements: = P1 + P2

The position of the centre of gravity can be expressed as a chord percentage: Xt% = (Xt / M.A.C.) x 100, where M.A.C. is the length of the chord.

7.3 CHECKING THE RESULTS

For proper balancing, the centre of gravity must lie within the two limits shown in the following table:

Maximum limit	Chord percentage (Xt%)	Position on the chord (Xt)
Front	28% M.A.C.	375 mm
Rear	37% M.A.C.	496 mm

The first recording of the aircraft weighing report is carried out by the manufacturer FlySynthesis before delivering the aircraft. The factory Weighing and centring report is delivered together with the aircraft.

Any variation due to the installation of new components, repairs or painting implies the obligation to remeasure the empty weight and calculate the relative position of the centre of gravity. All of these updates must be entered in the Weighing and centring report.

If the centre of gravity does not lie within the limits, contact the manufacturer to identify and solve the balancing problem.

DAILY MAINTENANCE

8

8. DAILY MAINTENANCE

Daily maintenance must be carried out by visually inspecting the aircraft every day, checking the efficiency and functionality of each component. The visual and functional inspection is fundamental, also during fuelling, fuel system draining and pre-flight inspection phases, where any anomaly must be identified and corrected to ensure flight safety.

8.1 REFUELLING:

See section 4.2.2

8.2 TANK DRAINING :

Seer section 4.2.3

8.3 PRE-FLIGHT INSPECTIONS :

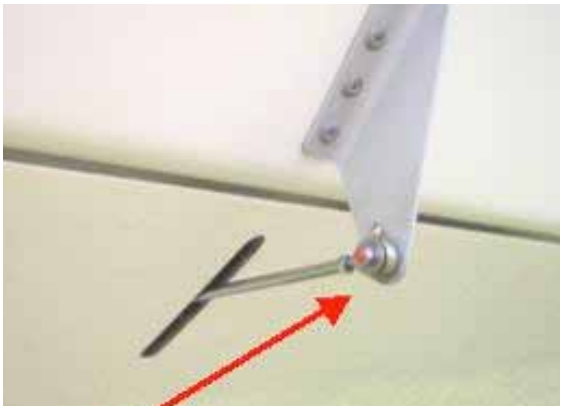
See section 4.3

8.4 DAILY OPERATIONS

8.4.1 Flying tail hinge

Clean and lubricate all heads and the hinge of the flying tail, as shown in the figure.
Use a lubricant spray that is suitable for marine operations.

8.4.2 Trim-tab control



Clean and lubricate all joints, as shown in the figure.

8.4.3 Fin and rudder

Clean and lubricate the heads of the push-pull cables on the rudder connection plate

Clean and lubricate also the two lower and upper rudder hinges

8.4.4 Landing gear

Clean and lubricate the various landing gear and retraction system connection points.

Use a lubricant spray that is suitable for marine operations.

ATTENTION

After landing on muddy fields, it is compulsory to wash and clean landing gear vanes.This because mud could compromise the correct landing gear retraction/extraction procedure. If not done, severe damages could occur to the structure.

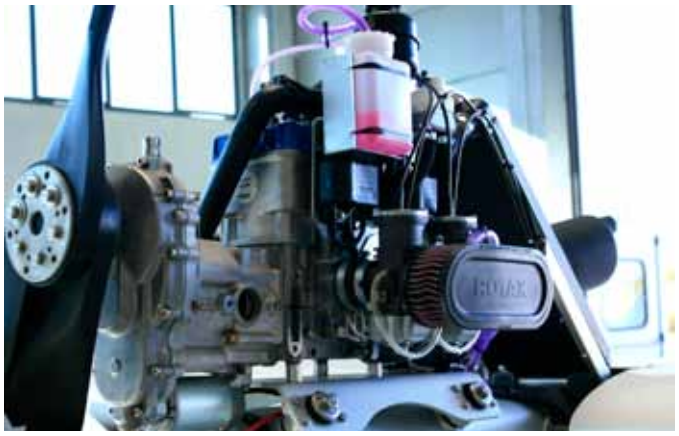
8.4.5 Rudder pedal unit

Clean and lubricate the heads of the pedal unit control cable connections.

8.4.6 Hull

Open all inspection hatches and check for water inside the watertight compartments. In the case of a prolonged stop, leave the hatches open to permit any condensation to evaporate.
Also check all the hull-outerwing and fuselage beam hull fastening connections. Check that all connections are tight.

8.4.7 Engine



DISCONNECT THE BATTERY FROM THE AIRCRAFT'S ELECTRIC SYSTEM.

Wash with freshwater and lubricate with a lubricant spray suitable for marine operations.

8.4.8 Electric system

Pay attention not to get the electric connections wet. Clean and lubricate with a protective silicone-based spray.

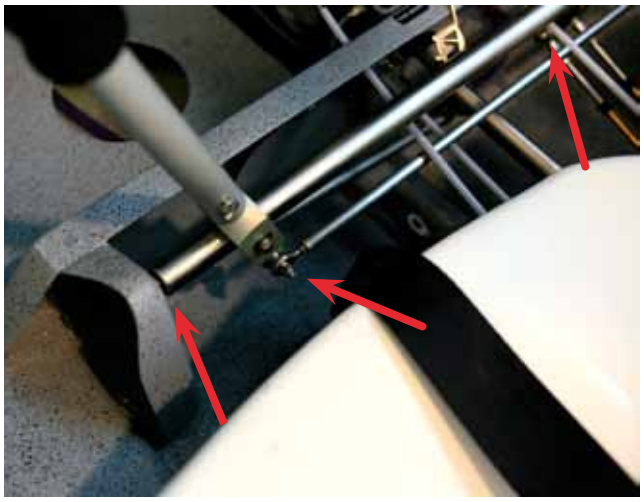
8.4.9 Aircraft cleaning

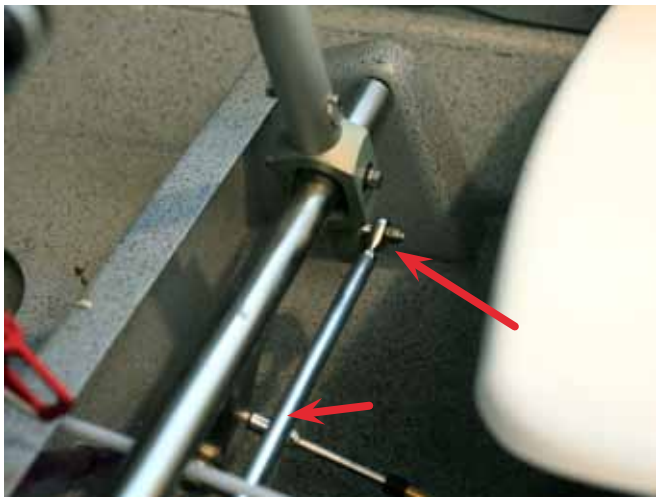
IMPORTANT

After using the aircraft in the water, all external surfaces must be washed with freshwater. **Do not use high pressure and/or high temperature water jets,** this could damage the aircraft's surfaces.

8.4.10 Flight controls

After using the aircraft in the water, clean and lubricate all articulated joints in the flight control lines.





9. SCHEDULED MAINTENANCE

9.1 INSPECTION PLANNING

Scheduled maintenance is carried out with planned inspections in cycles of 50 hours of flight. The type of inspection is divided into 4 categories, which are provided in the table: 25 hour inspections, 50 hour inspections, 100 hour inspections, 200 hour of flight inspections, continuing every 50 hours.

The normal cycle is repeated as follows :

Hours of flight	Inspection Type	Hours of flight	Inspection Type	Hours of flight	Inspection Type	Hours of flight	Inspection Type
25	25	275	50	525	50	775	50
50	50	300	100	550	50	800	200
75	50	325	50	575	50	825	50
100	100	350	50	600	200	850	50
125	50	375	50	625	50	875	50
150	50	400	200	650	50	900	100
175	50	425	50	675	50	925	50
200	200	450	50	700	100	950	50
225	50	475	50	725	50	975	50
250	50	500	100	750	50	1000	Overhaul

In any case, scheduled maintenance must be carried out after one year if the aircraft did not reach the number of hours necessary for the subsequent type of inspection. Other overhaul limits for some equipment are pointed out separately.

9.2 DESCRIPTION OF THE INSPECTION

Each time the table indicates checking nut and bolt tightening, check the table in the appendix.

General rule: at each inspection, perform a visual check and lubricate all moving parts.

SCHEDULED INSPECTIONS FOR CATALINA		INSPECTION TYPE			
Zone	Operations to carry out	25	50	100	200
GENERAL					
	Make sure that the injection switches are OFF and the master switch (key) is removed.	O	O	O	O
	Open all inspection hatches.	X	X	X	X
	Remove the seats and seat belts	X	X	X	X
	Check all rivets for any leaks or breaks. Replace missing rivets with standard compliant rivets.	O	O	O	O
PROPELLER					
	Inspect the propeller blades for breaks or defects. Always refer to the propeller manual for any repairs	O	O	O	O
	Check bolt tightness, consult the propeller manual for the tightening torque	X		X	X
HULL					
	Inspect the fuselage, especially the hull, and check for any defects. Check for skin delamination, make sure there are no cracks in the inner structure. Check the gluing of the hull ribs and mobile surfaces.	O	O	O	O
	Check the landing gear mechanisms. There must not be signs of cracks and check the bolt tightening. (The check can also be performed with the specific video devices, such as fibre optic probes) (only visual check at 50h)	X	O	X	X
	Check the conditions of the antenna, that it is connected correctly and its bolts are correctly tightened.	O	O	O	O
	Check the beam-outer wing connections, the tightening of the respective bolts and the general conditions of the connection flanges. (only visual check at 50h)	X	O	X	X
	Clean the windshield and check its conditions. Check its connection to the structure.	O	O	O	O
FLIGHT CONTROLS					
	Check the surface of the ailerons, check their regular and agile movement, check for play, the lateral movement on the hinge must be minimum.	O	O	O	O
	Check the tightening of the bolts that connect the hinge. Check the hinge pins and their hold (use Loctite)	X		X	X
	Check the surface of the flying tail, check its regular and agile movement, check for play, the lateral movement on the hinge must be minimum.	X		X	X
	Check the bolts that connect the hinge to the flying tail, check for play.	O	O	O	O
	Check the surface of the rudder, check its regular and agile movement, check for play, the vertical movement on the hinge must be minimum.	O	O	O	O
	Check the bolts that connect the hinge to the hull, check for play.	O	O	O	O
Note: The maximum permissible play on the control surface, lateral for the ailerons and vertical for the rudder, is 0.6 mm					
	Check the kinematic motion of the ailerons and its clamps, check for distortion, check the correct movement when fully extended.			X	X

Key: **O = visual check only**

X = complete maintenance, tools and instruments required

SCHEDULED INSPECTIONS FOR CATALINA		INSPECTION TYPE			
Zone	Operations to carry out	25	50	100	200
FLIGHT CONTROLS					
	Check the Bowden cables and their clamps, check the tension and replace if necessary.	O		O	O
	Check the correct operation of the trim and regularity of its surface conditions.	O		O	O
	Check the trim cable, check its regular and agile movement, check the clamps and check the irreversibility of the uncontrolled movement.	O		O	O
	Check the flap movement mechanism, check for distortions, check its correct movement along the entire extension. Check the hinge pins.	O		O	O
	Check the trim surface, its correct installation and for kinks in the hinges.	O		O	O
	Check the angular extension of the ailerons (up -2°/ down+15°)	O		O	O
	Check the angular extension of the flying tail (up+17°/down-12°)	O		O	O
	Check the angular extension of the rudder (+/- 22° with +0°/-1° per side)	O		O	O
	Check the trim movement (from neutral), the trailing edge must diverge from the flying tail movement by +/-5%	O		O	O
	Check the angular extension of the trim (with the flying tail neutral) the trailing edge must be +/- 3° with a deviation of +/-1°	O		O	O
	Slightly lubricate all moving parts and the respective hinges.	O	O	O	O
	Check the tightening of the hinge safety bolts of the ailerons fastened on the outer wings.	X		X	X
	Check the tightening of the self-locking safety nuts of the ailerons and the rods that connect the spherical head of the control flap . (inner part between the outer wing and the fuselage)	X		X	X
	Check the movement of the hull rudder, replacing the cords if necessary	X	X	X	X
	Check bilge pump operation, otherwise replace it	X			X
OUTER WINGS					
	Check the windbracing conditions, check for deformation, tightened nuts	O	O	O	O
	Check the condition of the wing's skin, check for delamination defectiveness or scratches.	O	O	O	O
PILOT COCKPIT					
	Carefully control the conditions of all control levers, check for any damage, abnormal play and check that the connection is secure. Clean and lubricate if necessary.	X		X	X
	Check the wiring and the installation of the electric system components, check the connection conditions.	O		O	O
	Clean inside the hull.	X	X	X	X
	Inspect the seats and the seat belts. Check the validity of the quick connections/releases on the seat belts and check the hooking points.	X		X	X

Key: **O = visual check only**

X = complete maintenance, tools and instruments required

SCHEDULED INSPECTIONS FOR CATALINA		INSPECTION TYPE			
Zone	Operations to carry out	25	50	100	200
PILOT COCKPIT					
	Control the instrument panel and its connection points. Check the instrument connections and the static and dynamic lines.	O		O	O
	Check the instrument's limitation panels			X	X
	Drain the instrument tubes to prevent the accumulation of condensation.	X	X	X	X
	Check the radio, navigation systems and the antenna.	O	O	O	O
LANDING GEAR					
	Check the integrity and movement of the hatches, disassemble them and lubricate			X	X
	Check the landing gear movement mechanism, lubricate the hinges and replace the electric actuator if necessary	X	O	X	X
	Check the front landing wheel, check for misalignments and breakage, check bolt tightening.	X		X	X
	Disassemble the front wheel landing gear, check the anchoring points of the moving part to the hull structure, check the steering plate, reassemble and check bolt tightening.			X	X
	Check the conditions of the front landing wheel and the respective tyre. Inflate to 1.2 bar (17.2 psi).	O	O	O	O
	Check the brake's hydraulic system in its entirety. Replace any damaged parts.	O		O	O
	Drain the hydraulic system. Top up with new fluid.			X	X
	Check the conditions of the hydroconic brake, replace if necessary. Check the tightening of the self-locking nuts.	X		X	X
	Remove the rear landing gear. Clean the movement parts and lubricate correctly. Make sure all the components are efficient and reinstall them, checking bolt tightening.			X	X
	Check the conditions of the wheels and the respective tyres. Inflate to a pressure of 2.2 – 2.4 bar (32 – 35 psi)	O	O	O	O
	Reinstall the wheels and check bolt tightening.			X	X
	Make sure that the wheel bearings move in a regular and agile manner, check for play.			O	O
	Check wheel alignment.	X		X	X
	Check the steering mechanism, replacing the cords if ruined.			X	X
ENGINE					
	ALL ENGINE MAINTENANCE MUST BE PERFORMED IN COMPLIANCE WITH THE ENGINE MANUAL. This part of the manual only covers the checks for the engine's installation on the fuselage.	X	X	X	X
	Check the part of the fuel system connected to the engine. Check that the connections are secure and replace if necessary.	O		O	O
	Check the electric fuel pump. Remove it to clean the filter.	O	O	O	O

Key: **O = visual check only**
X = complete maintenance, tools and instruments required

SCHEDULED INSPECTIONS FOR CATALINA		INSPECTION TYPE			
Zone	Operations to carry out	25	50	100	200
ENGINE					
	Check the cables controlled by the choke and gas throttle, check their voltage and any interference with other parts. The movement must be free and agile. Clean and lubricate the cables.	O		O	O
	Check the carburettors, check for any problems and adjust if necessary. Clean if necessary.		X	X	X
	Clean the carburettors (refer to the ROTAX manual)			X	X
	Clean or replace the air filters (refer to the ROTAX manual)	O		O	O
	Inspect the carburettor installation flanges	X	X	X	
	Replace the carburettor installation flanges				X
	Check the integrity of the silent-blocks and replace them if necessary	X	X	X	
	Replace the silent-blocks				X
	Check the tightening torque of the bolts connecting the engine to the engine mount. (Refer to the ROTAX manual)	X		X	X
	Check the tightening of the self-tightening nuts that connect the fuselage to the engine mount.	X		X	X
	Check the radiator tightening	X		X	X
	Check the exhaust manifold tightening	X		X	X
	Check the entire gas exhaust system, check for leaks, breaks and the hold of the springs installed to hold the muffler.	O		O	O
	Check the secure connection of the cooling radiator.	X		X	X
	Check or replace all cooling system ducts.				
	Check the terminal conditions.				X
	Check all electric system wires that concern the engine.	O		O	O
	Check the level of the coolant, top up if necessary.	X	X	X	
	Replace the coolant				X
	Check the engine casing and check for leaks or problems	O		O	O
	Check all fuel system connection pipes.	O		O	O
	Check the cooling system connection pipes and expansion tanks.	O		O	O
	Check all engine probes.	O	O	O	O
	Check the battery electrolyte, top up if necessary.	O		O	O
	Check the battery support, its anchoring, check for any leaks in the battery casing and the electrolyte properties (must always be clean).	O	O	O	O
	Check the battery cables.	O	O	O	O
FINISHES					
	Check that the tools have been removed from the aircraft.	X	X	X	X
	Close all inspection holes.	X	X	X	X
	Clean the cabin.	X	X	X	X
	Reinstall the seats and safety belts.	X	X	X	X
Key:	**O = visual check only**				
	X = complete maintenance, tools and instruments required				

If the aircraft has not reached the 100 hours of flight within the first 12 months, the 100 hours of flight maintenance operations must be carried out to restore safe aircraft conditions.
If the aircraft has not reached the 200 hours of flight within the first 24 months, the 200 hours of flight maintenance operations must be carried out to restore safe aircraft conditions.

9.3 EXPIRATION LIMITS FOR SOME COMPONENTS

The following components must be removed for inspection and complete overhaul, respecting the defined deadlines:

Engine ROTAX 582 DCDI UL:	300 hours, whichever of the two conditions occurs first, refer to the ROTAX manual.
Propeller	refer to the propeller manual
Silent-block	replace after 150 hours or every 2 years (whichever occurs first)

10. UNSCHEDULED MAINTENANCE

10.1 HARD LANDING

A hard landing must be recorded in the flight log by the pilot or a technician after observing the conditions of the landing gear. The following inspection must be carried out:

1. Disassemble all landing gear, check for breaks in the wheels and in the kinematic motion components. Check for misalignments, check the connection and tightening of the bolts. Check for leaks or breaks in the step and check the welds. Replaced the damaged components.
2. Check for any leaks or abrasions on the hull.
3. Check for distortion of the engine mount or tail boom
4. Check for distortion of the wing struts and the front struts where the instrument panel is fixed
5. Check for distortion of the flanges and the wing connections.

10.2 DAMAGE TO THE COMPOSITE STRUCTURE

For problems of this type, contact Fly Synthesis s.r.l, as in order to guarantee completely safe use of the aircraft, the nature and seriousness of the structural damage must be carefully examined. Yielding of the composite structure during flight could have catastrophic outcomes.

10.2.1 EXCEEDING ENGINE LIMITS

If the restrictions concerning rotation speed, time, pressure or temperature limits have been exceeded, record the event in the aircraft's log and refer to the ROTAX maintenance manual.

10.2.2 EXCEEDING LOAD LIMITS AND AIRCRAFT SPEED

If the load coefficient limits or the VNE have been exceeded, the aircraft is no longer approved for flight. Therefore to restore airworthiness, the aircraft must be checked following the 200 hour inspection program.

10.2.3 AIRCRAFT PAINTING

The aircraft is delivered white. It is prohibited to paint the upper surfaces of the wings and fuselage with dark paint, as the increase in absorption of the sun's heat could damage the composite structure. After any painting operation, the aircraft's weight and centring must be verified (see flight manual).

APPENDIX

11

11. APPENDIX

11.1 UNIT OF MEASURE CONVERSION TABLES

11.1.1 Distance conversion table

meters (m)		feet (Ft)	meters (m)		feet (Ft)	meters (m)		feet (Ft)	meters (m)		feet (Ft)
0,305	1	3,281	7,925	26	85,30	15,54	51	167,3	23,16	76	249,3
0,610	2	6,562	8,230	27	88,58	15,85	52	170,6	23,47	77	252,6
0,914	3	9,843	8,534	28	91,86	16,15	53	173,9	23,77	78	255,9
1,219	4	13,12	8,839	29	95,14	16,46	54	177,2	24,08	79	259,2
1,524	5	16,40	9,144	30	98,43	16,76	55	180,4	24,38	80	262,5
1,829	6	19,69	9,449	31	101,7	17,07	56	183,7	24,69	81	265,7
2,134	7	22,97	9,754	32	105,0	17,37	57	187,0	24,99	82	269,0
2,438	8	26,25	10,06	33	108,3	17,68	58	190,3	25,30	83	272,3
2,743	9	29,53	10,36	34	111,5	17,98	59	193,6	25,60	84	275,6
3,048	10	32,81	10,67	35	114,8	18,29	60	196,9	25,91	85	278,9
3,353	11	36,09	10,97	36	118,1	18,59	61	200,1	26,21	86	282,2
3,658	12	39,37	11,28	37	121,4	18,90	62	203,4	26,52	87	285,4
3,962	13	42,65	11,58	38	124,7	19,20	63	206,7	26,82	88	288,7
4,267	14	45,93	11,89	39	128,0	19,51	64	210,0	27,13	89	292,0
4,572	15	49,21	12,19	40	131,2	19,81	65	213,3	27,43	90	295,3
4,877	16	52,49	12,50	41	134,5	20,12	66	216,5	27,74	91	298,6
5,182	17	55,77	12,80	42	137,8	20,42	67	219,8	28,04	92	301,8
5,486	18	59,06	13,11	43	141,1	20,73	68	223,1	28,35	93	305,1
5,791	19	62,34	13,41	44	144,4	21,03	69	226,4	28,65	94	308,4
6,096	20	65,62	13,72	45	147,6	21,34	70	229,7	28,96	95	311,7
6,401	21	68,90	14,02	46	150,9	21,64	71	232,9	29,26	96	315,0
6,706	22	72,18	14,33	47	154,2	21,95	72	236,2	29,57	97	318,2
7,010	23	75,46	14,63	48	157,5	22,25	73	239,5	29,87	98	321,5
7,315	24	78,74	14,94	49	160,8	22,56	74	242,8	30,18	99	324,8
7,620	25	82,02	15,24	50	164,0	22,86	75	246,1	30,48	100	328,1

11.1.2 Speed conversion table

m/s	km/h	kts	m/s	km/h	kts	m/s	km/h	kts	m/s	km/h	kts
0,278	1	0,540	7,222	26	14,04	14,17	51	27,54	21,11	76	41,04
0,556	2	1,080	7,500	27	14,58	14,44	52	28,08	21,39	77	41,58
0,833	3	1,620	7,778	28	15,12	14,72	53	28,62	21,67	78	42,12
1,111	4	2,160	8,056	29	15,66	15,00	54	29,16	21,94	79	42,66
1,389	5	2,700	8,333	30	16,20	15,28	55	29,70	22,22	80	43,20
1,667	6	3,240	8,611	31	16,74	15,56	56	30,24	22,50	81	43,74
1,944	7	3,780	8,889	32	17,28	15,83	57	30,78	22,78	82	44,28
2,222	8	4,320	9,167	33	17,82	16,11	58	31,32	23,06	83	44,82
2,500	9	4,860	9,444	34	18,36	16,39	59	31,86	23,33	84	45,36
2,778	10	5,400	9,722	35	18,90	16,67	60	32,40	23,61	85	45,90
3,056	11	5,940	10,00	36	19,44	16,94	61	32,94	23,89	86	46,44
3,333	12	6,479	10,28	37	19,98	17,22	62	33,48	24,17	87	46,98
3,611	13	7,019	10,56	38	20,52	17,50	63	34,02	24,44	88	47,52
3,889	14	7,559	10,83	39	21,06	17,78	64	34,56	24,72	89	48,06
4,167	15	8,099	11,11	40	21,60	18,06	65	35,10	25,00	90	48,60
4,444	16	8,639	11,39	41	22,14	18,33	66	35,64	25,28	91	49,14
4,722	17	9,179	11,67	42	22,68	18,61	67	36,18	25,56	92	49,68
5,000	18	9,719	11,94	43	23,22	18,89	68	36,72	25,83	93	50,22
5,278	19	10,26	12,22	44	23,76	19,17	69	37,26	26,11	94	50,76
5,556	20	10,80	12,50	45	24,30	19,44	70	37,80	26,39	95	51,30
5,833	21	11,34	12,78	46	24,84	19,72	71	38,34	26,67	96	51,84
6,111	22	11,88	13,06	47	25,38	20,00	72	38,88	26,94	97	52,38
6,389	23	12,42	13,33	48	25,92	20,28	73	39,42	27,22	98	52,92
6,667	24	12,96	13,61	49	26,46	20,56	74	39,96	27,50	99	53,46
6,944	25	13,50	13,89	50	27,00	20,83	75	40,50	27,78	100	54,00

11.2 STANDARD ATMOSPHERE CONVERSION TABLE

z (m)	z (ft)	T (°C)	T (°K)	T/To	Pz (mm Hg)	Pz (mbar)	P/Po	ρz (Kg/m³)	ρ/ρo
-1000	-3280.84	21.5	294.66	1.022	854.475	1139.300	1.124	1.353	1.105
-900	-2952.76	20.85	294.01	1.020	844.609	1126.146	1.111	1.340	1.094
-800	-2624.67	20.2	293.36	1.018	834.836	1113.115	1.098	1.327	1.083
-700	-2296.59	19.55	292.71	1.015	825.155	1100.206	1.085	1.313	1.072
-600	-1968.5	18.9	292.06	1.013	815.564	1087.419	1.073	1.300	1.061
-500	-1640.42	18.25	291.41	1.011	806.069	1074.752	1.060	1.287	1.051
-400	-1312.34	17.6	290.76	1.009	796.654	1062.206	1.048	1.275	1.040
-300	-984.252	16.95	290.11	1.006	787.334	1049.778	1.036	1.262	1.030
-200	-656.168	16.3	289.46	1.004	778.101	1037.468	1.023	1.249	1.020
-100	-328.084	15.65	288.81	1.002	768.954	1025.276	1.011	1.237	1.010
0	0	15	288.16	1	759.9	1013.2	1	1.225	1
100	328.084	14.35	287.51	0.997	750.929	1001.239	0.988	1.212	0.990
200	656.168	13.7	286.86	0.995	742.044	989.392	0.976	1.200	0.980
300	984.252	13.05	286.21	0.993	733.245	977.660	0.964	1.188	0.970
400	1312.336	12.4	285.56	0.990	724.530	966.040	0.953	1.176	0.960
500	1640.42	11.75	284.91	0.988	715.899	954.533	0.942	1.165	0.951
600	1968.504	11.1	284.26	0.986	707.352	943.137	0.930	1.153	0.941
700	2296.588	10.45	283.61	0.984	698.888	931.851	0.919	1.142	0.932
800	2624.672	9.8	282.96	0.981	690.506	920.675	0.908	1.130	0.923
900	2952.756	9.15	282.31	0.979	682.205	909.607	0.897	1.119	0.913
1000	3280.84	8.5	281.66	0.977	673.986	898.648	0.886	1.108	0.904
1100	3608.924	7.85	281.01	0.975	665.847	887.796	0.876	1.097	0.895
1200	3937.008	7.2	280.36	0.972	657.787	877.050	0.865	1.086	0.886
1300	4265.092	6.55	279.71	0.970	649.807	866.410	0.855	1.075	0.877
1400	4593.176	5.9	279.06	0.968	641.905	855.874	0.844	1.064	0.869
1500	4921.26	5.25	278.41	0.966	634.082	845.443	0.834	1.054	0.860
1600	5249.344	4.6	277.76	0.963	626.336	835.114	0.824	1.043	0.851
1700	5577.428	3.95	277.11	0.961	618.666	824.889	0.814	1.033	0.843
1800	5905.512	3.3	276.46	0.959	611.073	814.764	0.804	1.022	0.834
1900	6233.596	2.65	275.81	0.957	603.556	804.741	0.794	1.012	0.826
2000	6561.68	2	275.16	0.954	596.113	794.818	0.784	1.002	0.818
2100	6889.764	1.35	274.51	0.952	588.745	784.994	0.774	0.992	0.809
2200	7217.848	0.7	273.86	0.950	581.451	775.268	0.765	0.982	0.801
2300	7545.932	0.05	273.21	0.948	574.231	765.641	0.755	0.972	0.793
2400	7874.016	-0.6	272.56	0.945	567.083	756.110	0.746	0.962	0.785
2500	8202.1	-1.25	271.91	0.943	560.005	746.676	0.736	0.952	0.777
2600	8530.184	-1.9	271.26	0.941	553.003	737.338	0.727	0.943	0.769
2700	8858.268	-2.55	270.61	0.939	546.070	728.094	0.718	0.933	0.762
2800	9186.352	-3.2	269.96	0.936	539.208	718.944	0.709	0.924	0.754
2900	9514.436	-3.85	269.31	0.934	532.416	709.887	0.700	0.914	0.746

11.3 INDICATED SPEED CONVERSION

The speed conversion table, which provides the correction factor for obtaining the true speed (TAS) from the instantaneous speed (IAS), according to the simplified formula:

TAS = IAS*Cor. factor

ICAN (international comitee for air navigation)

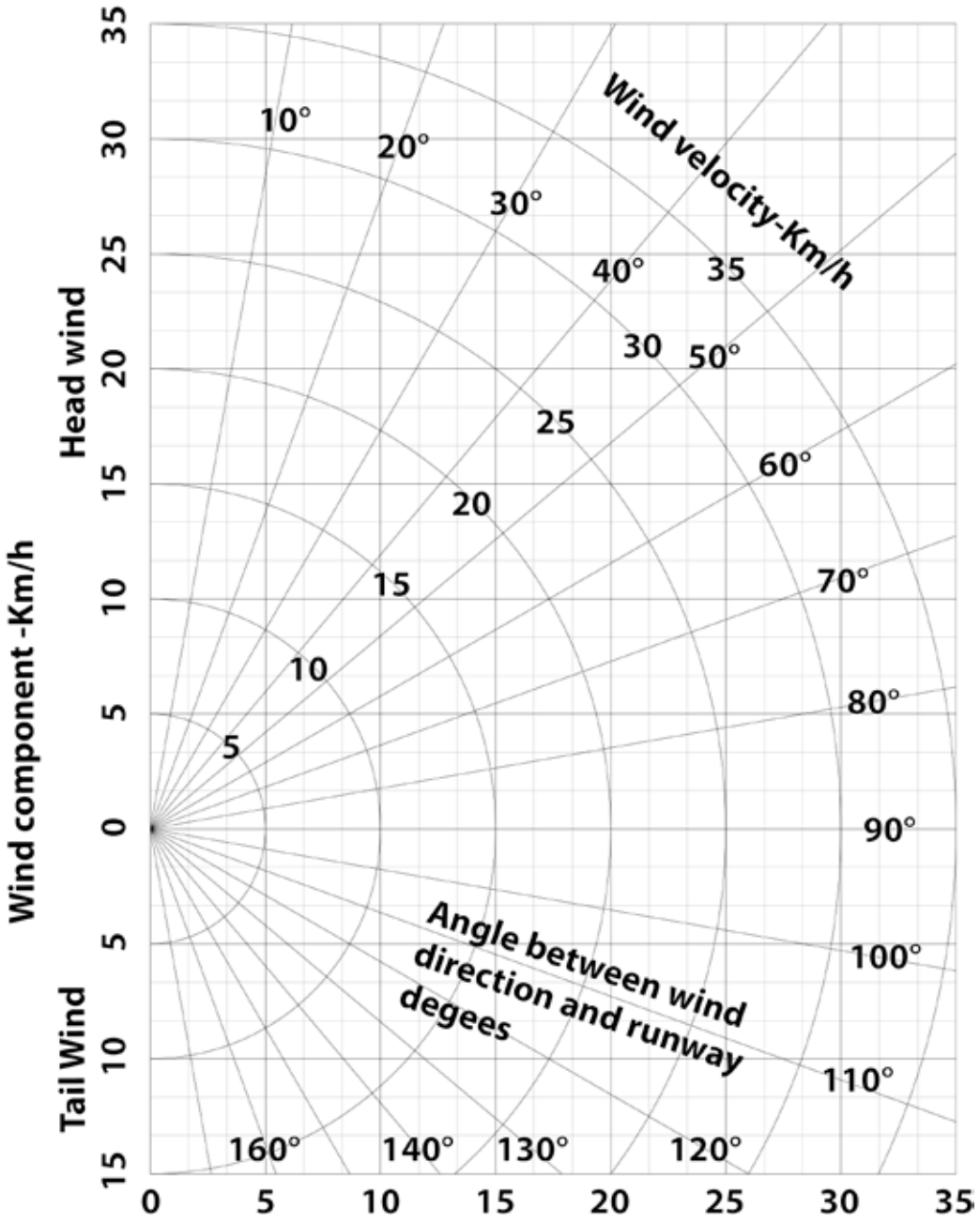
temperatures, relative pression, relative densitè est IAS a IAS correction factor in relation to the altitude.

feet	Mt	°C	°F	Relative pressure	Relative density	Cor. factors
-2000	-610	18,96	66,1316	1,084	1,063	0,970
-1000	-305	16,98	62,5658	1,046	1,031	0,985
0	0	15	59	1	1	1
1000	305	13,02	55,43	0,973	0,970	1,015
2000	610	11,04	51,87	0,938	0,941	1,031
3000	914	9,06	48,30	0,905	0,913	1,047
4000	1219	7,08	44,74	0,872	0,885	1,063
5000	1524	5,10	41,17	0,840	0,858	1,079
6000	1829	3,11	37,61	0,809	0,832	1,096
7000	2134	1,13	34,04	0,779	0,807	1,113
8000	2438	-0,85	30,47	0,750	0,783	1,130
9000	2743	-2,83	26,91	0,722	0,759	1,148
10000	3048	-4,81	23,34	0,694	0,736	1,166
11000	3353	-6,79	19,78	0,668	0,713	1,184
12000	3658	-8,77	16,21	0,642	0,691	1,203
13000	3962	-10,75	12,64	0,617	0,669	1,222
14000	4267	-12,73	9,079	0,593	0,648	1,242
15000	4572	-14,72	5,513	0,570	0,628	1,262
16000	4877	-16,70	1,947	0,547	0,608	1,283
17000	5182	-18,68	-1,619	0,525	0,588	1,304

11.4 CROSSWIND DIAGRAM

The maximum relative crosswind value is 32 km/h or 17 kts

The following diagram shows the cross component relative to the head and tail wind..



11.5 BOLT TIGHTENING TORQUE TABLE

11.5.1 Steel - steel connection

This includes composite coupling with through screws and washers from both sides.

11.5.1.1 Screws resistance class 8.8

- Screws M4 : 0.30 kg*mt
- Screws M5: 0.55 kg*mt
- Screws M6: 0.95 kg*mt
- Screws M8: 2.40 kg*mt
- Screws M10: 5.0 kg*mt

11.5.1.2 Stainless steel screws resistance class A2-70

- Screws M5: 0.45 kg*mt
- Screws M6: 0.78 kg*mt
- Screws M8: 1.85 kg*mt
- Screws M10: 3.75 kg*mt

11.5.1.3 Nuts buried in resin or threaded inserts

- Screws M5: 0.42 kg*mt
- Screws M6: 0.75 kg*mt
- Screws M8: 1.60 kg*mt

11.5.2 Propeller bolts

Refer to the propeller manual

Strada provinciale nr. 78 km 12,150
33050 Mortegliano (UD)
Italy